Central Bank of the Republic of China (Taiwan)

Financial Stability Report

May 2023 | Issue No. 17

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About the Financial Stability Report

Key points of the task to promote financial stability

Promoting financial stability not only is one of the operational objectives pursued by the Central Bank of the Republic of China (Taiwan), but also lays the cornerstone for the effective implementation of monetary policy. To achieve this objective, in addition to serving as lender of last resort when necessary, the Bank regularly monitors the financial system and the overall economic and financial environment. This allows it to be constantly aware of the potential vulnerabilities and risks that could threaten financial stability so that the relevant financial authorities and market participants can respond in a timely manner to avoid financial turbulence.

In its work to promote financial stability, the Bank focuses primarily on the risks that could affect the stability of the overall financial system. Nevertheless, the Bank still pays close attention to the status of individual institutions as their weaknesses can trigger systemic risks.

Purpose of this report

The Financial Stability Report is issued annually. The aims of this report are to offer insight into the state of Taiwan's financial system and its potential vulnerabilities and risks, and to spark broad-based discussion that will enhance awareness of risk among market participants and spur them to take responsive action in a timely manner. This does not mean, however, that the risks mentioned in this report are sure to occur. Furthermore, this report is intended to serve as a reference for financial authorities, market participants, and others interested in the subject. Readers are advised to interpret or quote the information contained herein with caution.

Definition of financial stability

There is as yet no universally accepted definition of "financial stability." Defined positively, "financial stability" can be thought of in terms of the financial system's ability to: (1) facilitate an efficient allocation of economic resources both spatially and intertemporally; (2) assess and manage financial risks; and (3) withstand adverse shocks. From a negative view, "financial instability" refers to the occurrence of currency, banking, or foreign debt crises, or inability of the financial system to absorb adverse endogenous or exogenous shocks and allocate resources efficiently, with the result that it cannot facilitate real economic performance in a sustained manner.

Note:	***Except as otherwise noted, all data and information cited in this report are current as of April 30, 2023.***

Abstract

In 2022, to curb rising inflation, central banks in major economies accelerated the cycle of interest rate hikes, which not only tightened international financial conditions, but also accelerated the decline in global economic growth. Nevertheless, economic growth momentum in Taiwan was strong. Inflation remained relatively moderate compared to other countries, albeit with heightened domestic prices. Revenue and profits of the corporate sector performed well and the financial condition of households also remained satisfactory. In addition, the government persistently endeavored to implement measures to ensure a healthy housing market which contributed to fostering its sound development. Under this macro environment, financial markets in Taiwan kept operating smoothly. Financial institutions, aside from insurance companies which need ongoing improvement, have generally maintained sound operations. Meanwhile, domestic systemically important payment systems also functioned in an orderly manner. On the whole, the financial system remained largely stable; however, the potential impacts stemming from a myriad of uncertainties surrounding international economic and financial conditions on Taiwan's financial system warrant close attention.

Spillover effects resulting from rapid tightening of monetary policies by major central banks had impacts on international and domestic macro environments

In 2022, in response to elevated inflation, central banks in major economies increased the pace of monetary policy tightening, causing spillover effects that not only tightened international financial conditions, but also accelerated the global economic growth downturn. Looking into 2023, despite the fact that the reopening of the Chinese economy is expected to bolster the global economy, financial conditions remain tight, and geopolitical risks are still high. Moreover, the US and European countries are facing downside risks to economic growth. S&P Global Market Intelligence (hereafter S&P Global) estimates that global economic growth will continually decline, and global inflationary pressures will be gradually alleviated yet still remain high. Furthermore, aggressive policy rate hikes by major central banks, such as the Federal Reserve System (Fed), have jolted global financial markets, and lifted debt risks and capital outflow pressures for emerging markets. Besides this, the swift actions taken by

authorities in the US and Europe in response to recent turmoil in the banking sector have temporarily contained market panic. Nevertheless, tighter financial conditions exacerbated global financial vulnerabilities, and financial instability stemming from rising geopolitical tension and climate change is a matter requiring close attention.

Regarding the domestic economy, Taiwan's economy grew steadily in 2022. Although domestic prices were still-elevated, inflation remained relatively moderate compared to other countries. The scale of external debt contracted and foreign exchange (FX) reserves remained ample, indicating robust external debt servicing capacity. Additionally, the government had a fiscal surplus and government debt stayed within a manageable level. The revenue of both Taiwan Stock Exchange (TWSE) listed and over-the-counter (OTC) listed companies reached record highs with favorable profits and their financial leverage decreased. Household financial conditions stayed sound and demonstrated satisfactory credit quality. Transactions in the housing market cooled down remarkably and the uptrend in house prices decelerated. The mortgage burden slightly decreased but still remained at a high level. Relevant ministries and agencies have actively implemented measures to ensure a healthy housing market so as to foster its sound development.

Financial markets, institutions, and infrastructures operated smoothly in Taiwan

From 2022 onwards, the outstanding amount of bill issuance edged down, while the trading volume increased. As for the bond market, the outstanding amount of issuance expanded, but its trading volume slightly decreased. Stock indices rallied after falling from record highs and were not significantly affected by the turmoil in the US and European banking sectors. The NT dollar turned to appreciate after depreciating against the US dollar, and FX markets remained dynamically stable. Benefiting from wider spreads between deposit and loan interest rates, profits for domestic banks reached record highs, and their asset quality strengthened with adequate capital levels. While the insurance industry faced somewhat bigger headwinds, capital increases and other measures were taken to address the adverse impacts. Profits for bills finance companies showed a downward trend, but their capital adequacy was satisfactory.

Furthermore, domestic systemically important payment systems functioned in an orderly manner. Meanwhile, the Financial Supervisory Commission (FSC) expressed intention to gradually implement appropriate monitoring of crypto assets. Additionally, to support the government's 2050 net-zero transition plan, the Bank released the strategic plan on climate change. The FSC also continued to promote the Green Finance Action Plan so as to facilitate Taiwan's sustainable development.

The Bank and the FSC kept taking measures to promote financial stability

From March 2022 onwards, the Bank raised the policy rates five times by a total of 0.75 percentage points and edged up the reserve requirement ratios on NTD deposits twice by a total of 0.5 percentage points, which helped restrain domestic inflation expectations. The Bank also conducted open market operations for the purpose of adjusting funds in the banking system. Besides this, the Bank kept adopting targeted macroprudential measures, in line with the government's Healthy Real Estate Market Plan, and maintained flexible FX policies to safeguard the dynamic stability of the NT dollar exchange rate. Meanwhile, the FSC undertook regulatory forbearance measures for insurers to help them cope with adverse impacts and implemented measures to stabilize the stock market and address market fluctuations. Furthermore, the FSC reinforced other supervisory policies, including continuing to enhance corporate governance of financial institutions and strengthening information security, so as to maintain financial stability.

The Bank will continually take measures to promote financial stability as needed

In 2022, despite major central banks' rapid tightening of monetary policies and a slowdown in global economic growth, Taiwan's financial markets continued to operate smoothly. Among financial institutions, the operations of the banking sector and bills finance companies remained steady. While the insurance industry faced significant headwinds, capital increases and other measures were taken to address the adverse impacts. Additionally, domestic systemically important payment systems operated smoothly. As a whole, Taiwan's financial system remained largely stable. Looking ahead, a number of factors such as the tightening of monetary policies by the Fed and European central banks along with corresponding spillover effects, growing uncertainty over commodity supplies resulting from climate change, and escalating geopolitical risks, could cause global inflationary pressures to persist, intensify financial market volatility, and heighten downside risks to the global economy. In response, the Bank will continue to pay close attention to the potential impacts of relevant subsequent developments and take appropriate response measures to promote domestic financial stability.

I. Overview

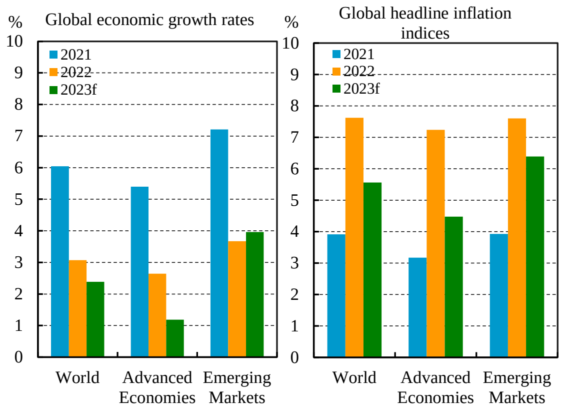
Potential macro environmental risk factors

International economic and financial conditions

Global economic growth slowed significantly, while inflation moderated after a sharp rise but still remained at elevated levels

In 2022, the Russia-Ukraine war caused supply shortages and a surge in commodity prices, exacerbating global inflationary pressures. These, together with China's zero-COVID policy, which intensified the strains on global supply chains, lifted the global consumer price index (CPI) inflation rate to 7.6%. To curb rising inflation, central banks of major economies accelerated the cycle of interest rate hikes, resulting in spillover effects that not only tightened international financial conditions, but also accelerated the decline in global economic growth. Consequently, the economic growth rate dramatically dropped to 3.1% (Chart 1.1).

Chart 1.1 Global economic growth rates and headline inflation indices



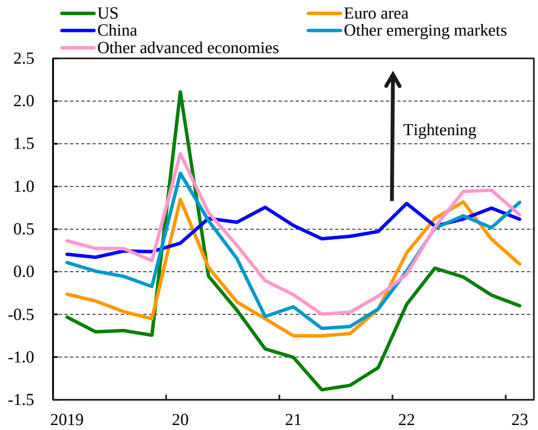
Note: Figures for 2023 are S&P Global Market Intelligence estimates.
Source: S&P Global Market Intelligence (2023/5/15).

Looking ahead to 2023, the withdrawal of China's zero-COVID policy is expected to boost the global economy. However, in view of tightened financial conditions, heightened geopolitical risks, and potential downside risks faced by the US and European economies, S&P Global[1] estimates that the global economic growth rate will continually decline to 2.3% in 2023. For advanced economies, growth is projected to substantially drop to 1.1%, while emerging economies are expected to demonstrate a slight rebound to 3.9%. Among emerging economies,

[1] S&P Global Market Intelligence (2023), *Global Executive Summary*, May.

the economic growth rate of China is anticipated to sharply pick up to 5.5% throughout the year given that the policy focus will shift from zero-COVID towards stabilizing economic growth. On the other hand, as the easing of the global pandemic and supply chain bottlenecks leads to a gradual alleviation of global inflationary pressures, the global CPI annual growth rate will come down to 5.6% but still remain high (Chart 1.1). The recent fallout of the banking turmoil in the US and Europe has induced financial tightening. Considering this, coupled with ongoing global inflationary pressures, the impact of the future trajectory of interest rate hikes and monetary policy stances by major central banks on the global economic growth and inflation outlook warrants close attention.

Chart 1.2 Global financial conditions indices



Notes: 1. Financial conditions indices are gauged by standard deviations from the mean. These indices were calculated quarterly in 2006-2019 and monthly after 2020.
2. Other emerging markets exclude Russia, Ukraine and Turkey.

Source: IMF (2023), *Global Financial Stability Report*, April.

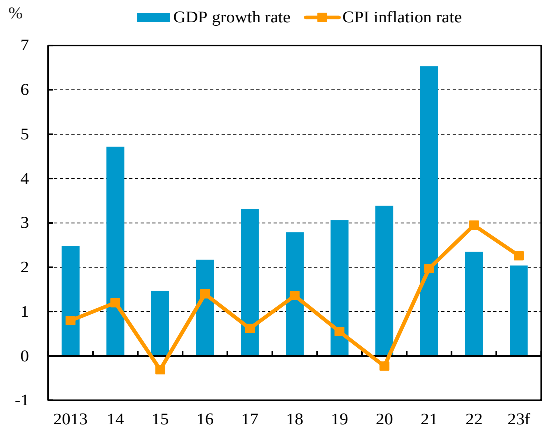
Tighter financial conditions eased but financial vulnerabilities mounted

In the first three quarters of 2022, major central banks, such as the Fed, accelerated the pace of monetary policy tightening, resulting in significantly tighter financial conditions in advanced economies. Afterwards, their financial conditions moderately loosened amid a recovery in global financial markets. By contrast, financial conditions in China remained accommodative over the same period as it continued to adopt an easy monetary policy with the aim of supporting economic growth (Chart 1.2).

Owing to high interconnectedness of global financial markets, the rapid interest rate hikes by the Fed have influenced investor risk appetite, leading to turbulence in global stock and bond markets, as well as lifting debt risks and capital outflow pressures for emerging markets. Moreover, a series of shocks in the US and Europe have hit banks since March 2023. Although the swift actions taken by central banks temporarily contained market panic, these events provided evidence that major central banks' ongoing tightening of monetary policy resulted in an environment of tighter financing conditions and global financial vulnerabilities could potentially accumulate.

Additionally, in China, funding pressures remained in the real estate market and the levels of local government debt continued to mount. Failing to address these problems could pose threats to financial institutions and exert pressure on the funding markets. Lastly, potential reversals in cross-border capital flows caused by rising geopolitical tensions, together with contagion effects and feedback effects stemming from climate change, would elevate financial risks, which is a matter requiring close attention.

Chart 1.3 Economic growth rate and CPI inflation rate of Taiwan



Note: Figures for 2023 are DGBAS forecasts released on May 26, 2023.
Source: DGBAS.

Domestic macro environment

Taiwan's economy grew steadily; domestic prices were still-elevated, but inflation remained relatively moderate compared to other countries, and external debt servicing capacity remained sound

Export growth slowed down in 2022; however, benefiting from steady growth in private consumption and investment, the annual economic growth rate reached 2.35% (Chart 1.3),[2] indicating robust economic growth. Annual CPI inflation rose to 2.95% in 2022 from 1.97% a year earlier, reaching a 14-year high. Nonetheless, compared to major economies, inflation in Taiwan remained relatively moderate. Looking ahead to 2023, despite various negative factors in the first half of the year, export momentum is expected to gradually recover in the second half, and government initiatives to enhance post-pandemic economic recovery will likely be conducive to domestic demand. In sum, the DGBAS predicts that the annual economic growth rate will register 2.04% in 2023, and the CPI annual inflation rate is anticipated to decrease to 2.26% throughout the year.

Taiwan's external debt[3] declined to US$202.1 billion at the end of 2022, and FX reserves amounted to US$554.9 billion, implying a robust capacity to service external debt. As a result of a significant increase in profit-seeking enterprise income tax and the budget implementation of the government in conjunction with austerity principle, the government fiscal surplus was NT$38.4 billion,[4] equivalent to 0.17% of gross domestic product (GDP) for the year and was

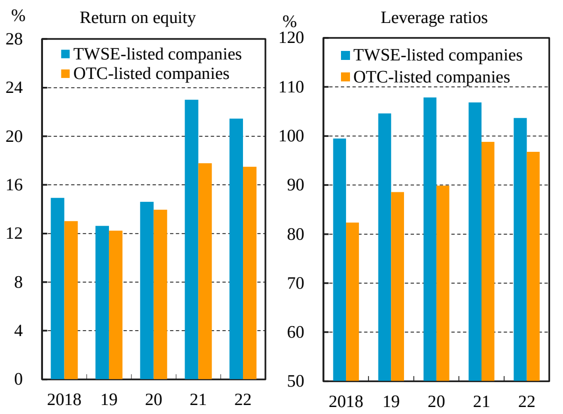
[2] Data cited from the DGBAS in this report such as Taiwan's economic growth rate, GDP and CPI figures of 2022, and forecasts of 2023 are referred to from its press release published on May 26, 2023.
[3] External debt refers to the combined amount owed to foreign parties by Taiwan's public and private sectors, including long-term debt with a maturity of greater than one year and short-term debt with a maturity of one year or less. Among them, public external debt refers to the external debt that the public sector is directly responsible for repayment or provides payment guarantees. Private external debt, on the other hand, refers to external debt that does not include payment guarantees from the public sector.
[4] It is based on the latest data from the Department of Statistics, Ministry of Finance, as of May 16, 2023.

higher than internationally recognized minimum levels.[5] The ratio of total public debt to annual GDP continued dropping to 29.69%, implying that government debt still stayed within a manageable level.[6]

Revenue of the corporate sector set new highs with favorable profits

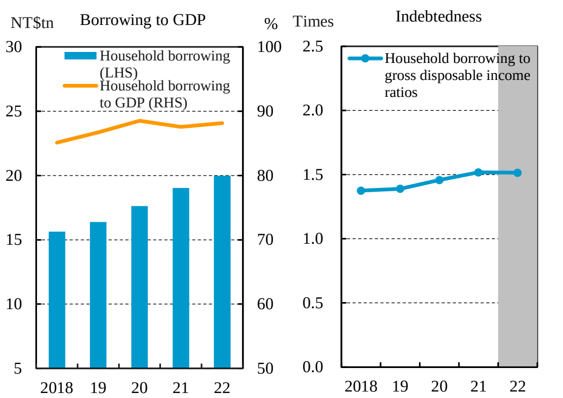
In 2022, thanks to continuous developments of emerging technology applications and digital transformation opportunities, the revenue and profit of both TWSE- and OTC-listed companies reached record highs and their profitability remained strong (Chart 1.4, left panel). However, profitability performance of the main industries took divergent paths. At the end of the year, leverage ratios for both TWSE- and OTC-listed companies decreased (Chart 1.4, right panel), and their current ratios trended upwards. On the other hand, their interest coverage ratios decreased owing to a greater increase in interest expenses, but the overall short-term debt servicing capacity remained sound. Finally, the non-performing loan (NPL) ratio for corporate loans from financial institutions dropped to a new low of 0.21% at the end of 2022, suggesting satisfactory credit quality.

Chart 1.4 Return on equity and leverage ratios in corporate sector



Notes: 1. Return on equity = net income before interest and tax/average equity.
2. Leverage ratio = total liabilities/total equity.
Source: TEJ.

Chart 1.5 Household indebtedness



Note: Total disposable income in shadow area is a CBC estimate.
Sources: CBC, JCIC, and DGBAS.

Household borrowing expanded at a slower pace, and its financial health was steady

Household borrowing reached NT$19.98 trillion at the end of 2022, equivalent to 88.15% of annual GDP for the year, higher than the 87.57% of the previous year (Chart 1.5, left panel).

[5] As a comparison, fiscal deficits in European Union (EU) member nations are not allowed to exceed 3% of GDP according to the *Maastricht Treaty* and the subsequent *Stability and Growth Pact*.

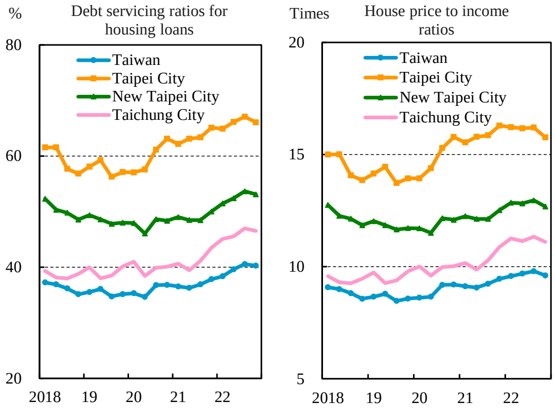
[6] As a comparison, outstanding government debt in EU member nations are not allowed to exceed 60% of GDP according to the *Maastricht Treaty* and the subsequent *Stability and Growth Pact*.

However, the annual growth rate of household borrowing rose at a slower pace of 4.95%, and the ratio of household borrowing to total disposable income marginally fell to 1.51 (Chart 1.5, right panel), reflecting a slightly eased household debt burden. By contrast, the debt servicing ratio ascended moderately to 48.87%, indicating that short-term household debt servicing pressure tightened to some extent. Nevertheless, household net worth[7] in Taiwan has been remarkable and has held at more than 7 times the GDP in recent years, showing a healthy financial condition. Meanwhile, the NPL ratio of household borrowing from financial institutions decreased to a new low of 0.12%, suggesting satisfactory credit quality, but any change in debt servicing capacity of some households with higher debt burdens warrants close attention in view of rising interest rates on bank loans and decreasing real monthly regular earnings for employees.

Transactions in the real estate market cooled down remarkably and growth in housing prices decelerated; the mortgage burden slightly decreased but still remained at a high level

The total number of building ownership transfers decreased by 8.64% in 2022 and that of land ownership transfers also fell by 8.45% year on year, both continuing the downward trends in the beginning of 2023. Meanwhile, the national housing price index released by the Ministry of the Interior (MOI) kept rising gradually in 2022, but at a slower annual pace. The Cathay housing price index (for newly built houses) saw a sharp increase in 2022 yet experienced the reverse trend in 2023 Q1. The Sinyi housing price index (for existing houses) kept its upward trend as well in the first three quarters of 2022 and has slightly fluctuated at high levels since Q4. Moreover, the debt servicing ratio for housing loans rose gradually quarter by quarter and mildly went down to 40.25% in 2022 Q4, while the house price to income ratio registered 9.61, with both showing an increase from the previous year. As for mortgage burden, Taipei City exhibited the heaviest one among the six metropolitan areas (Chart 1.6).

Chart 1.6 Debt servicing ratios for housing loans and house price to income ratios



Notes: 1. Debt servicing ratio for housing loans = median monthly housing loan payment/median monthly household disposable income.
2. House price to income ratio = median house price/median annual household disposable income.

Source: Housing Price Affordability Indicator Statistics, Construction and Planning Agency of the MOI.

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7 Household net worth includes household net non-financial assets and net financial assets. Net non-financial assets include produced assets (buildings and constructions, transport equipment, machinery equipment, etc.) and non-produced assets (construction land, non-construction land, and other assets). Net financial assets are domestic and foreign financial assets minus liabilities (deposits, loans, shares of listed companies or other enterprises, life insurance reserves, etc.).

Both housing loans and construction loans granted by banks grew at a slower pace in 2022 with rising mortgage interest rates. Furthermore, the NPL ratios for both loans dropped to 0.07% at the end of March 2023, showing satisfactory risk management on real estate lending. Since December 2020, the Bank has adjusted its targeted macroprudential measures four times, and it has continued to strengthen the risk management of real estate lending or guarantee business of financial institutions in collaboration with the FSC. The Bank and the FSC also launched a targeted examination toward mortgage loans to ensure banks' compliance with related regulations. Moreover, relevant ministries and agencies successively amended the regulations to refine management schemes and to prevent short-term speculation and tax evasion, which could foster sound development in the real estate market.

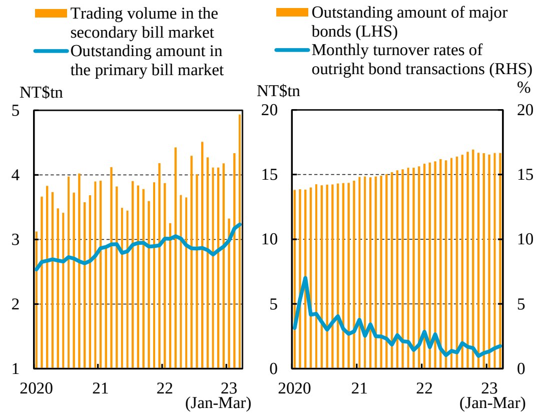
Financial system assessment

Financial markets

Bill issuance edged down, while bond issuance continued to expand

The outstanding amount of bill issuance in the primary market at the end of 2022 went down by 0.69% year on year, mostly attributed to the reduction in the issuance of treasury bills owing to the ample tax revenue. On the other hand, the trading volume in the secondary bill market increased by 7.86% year on year, thanks to factors such as strong demand for investment in commercial paper (CP) by corporates (Chart 1.7, left panel). As for the bond market, the outstanding amount of bond issuance in the primary market at the end of 2022 rose by 6.63%, compared to the end of the previous year, and reached a new high owing to the fact that foreign institutions issued bonds ahead of schedule or reduced early redemption of bonds given their expectation of the Fed's rate hikes. Nevertheless, considering that major bond market traders such as bills finance companies and securities firms reduced their bond holdings, trading volume in the secondary bond market[8]

Chart 1.7 Primary and secondary bill and bond markets



Notes: 1. Major bonds include government bonds, international bonds, corporate bonds, and financial debentures.
2. Monthly turnover rate = trading value in the month/average outstanding amount of bonds issued. Average outstanding amount of bonds issued = (outstanding amount at the end of the month + outstanding amount at the end of last month)/2.

Sources: CBC and FSC.

[8] Includes repo and outright transactions.

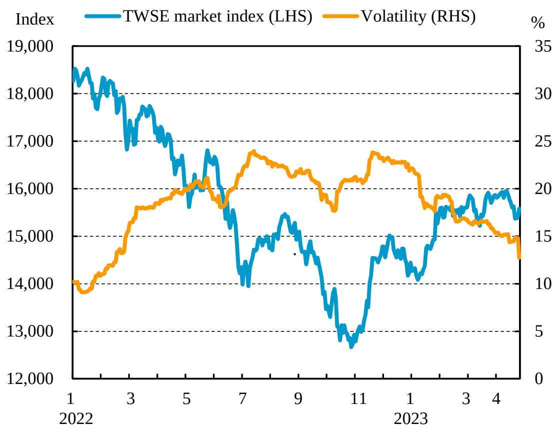
slightly decreased by 2.03%, and outright transaction volume significantly shrank compared to a year earlier. As a consequence, the average monthly outright turnover rate of major bonds[9] continued its downward trend and declined further to a record low of 1.55% in 2023 Q1 (Chart 1.7, right panel).

In 2022, the interbank overnight call loan rate elevated accordingly after the Bank raised the policy interest rates and its negotiable certificates of deposits (NCDs) interest rates four times, yet liquidity in financial markets remained ample. As for long-term market rates, domestic 10-year government bond yields hit a new 14-year high of 1.93% in October 2022 and descended gradually afterwards. Considering that inflation in major economies continues to be high and there are many uncertainties surrounding the future inflation outlook, together with the upward pressure on bond yields globally, the domestic 10-year government bond yields are likely to climb again. Therefore, the interest rate risks related to bond investments of financial institutions are worthy of attention.

Stock indices rebounded after falling from record highs and were not significantly affected by the turmoil in the US and European banking sectors

In the first three quarters of 2022, on account of the prolonged pandemic, the outbreak of the Russia-Ukraine war, the Fed's accelerated interest rate hikes, and China's zero-COVID policy, the Taiwan Stock Exchange Weighted Index (TAIEX) oscillated with a downward trend from the historical high of 18,526 at the beginning of the year. Since the beginning of October, thanks to the FSC's measures to stabilize the stock market, the index rallied and the volatility of the TWSE and the OTC markets gradually dropped to 21.33% and 22.71%, respectively, at the end of the year. Entering 2023 Q1, as economic activity gradually returned to normal and Taiwan's stock markets weren't significantly affected by the recent turmoil in the US and European banking sectors, the TAIEX and the Taipei Exchange Capitalization Weighted Stock Index (TPEX) of the OTC market fluctuated upwards. Their volatility also fell further at the end of April 2023 (Chart 1.8).

Chart 1.8 TWSE market index and volatility



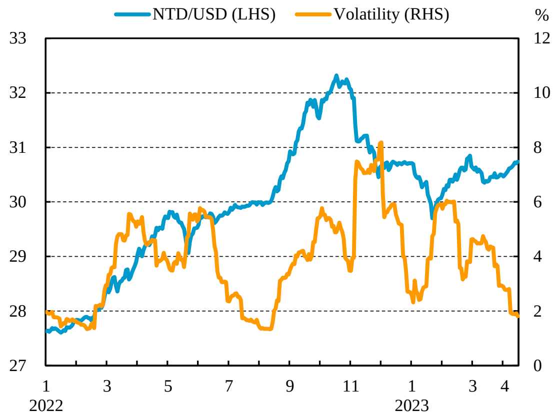
Note: Volatility refers to the annualized standard deviation of 60-day daily index returns.
Sources: TWSE and CBC.

9 Includes government bonds, international bonds, corporate bonds, and financial debentures.

Driven by notably declining trading volume of Taiwan's stock markets in 2022, the monthly average trading value in both the TWSE and the OTC markets slumped compared to a year earlier. Accordingly, the annual turnover rates in terms of trading value fell sharply to 115.44% and 315.73%, respectively, but were still higher than those in most major international stock markets. Looking ahead, domestic stock markets are supported by sound economic fundamentals. However, against the backdrop of rising uncertainties over the economic prospects and inflation trends in major economies, along with the persisting panic sentiment stemming from the banking turmoil in the US and Europe among financial markets, these factors may continue to affect the international stock markets and, in turn, impact the performance of domestic stock markets. It is worth paying close attention to these developments.

The NT dollar turned to appreciate after depreciating against the US dollar, while its volatility remained relatively stable

Chart 1.9 Movements of NT dollar exchange rate against US dollar

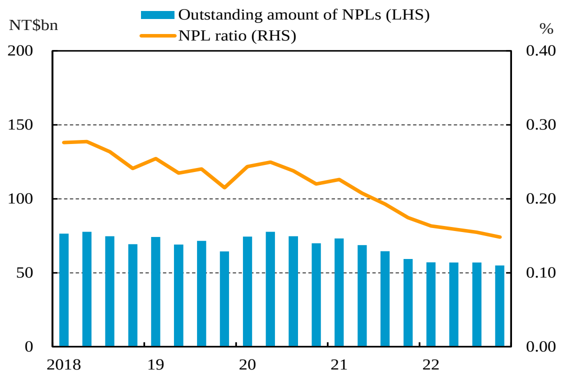


Note: Volatility refers to the annualized standard deviation of 20-day daily returns.
Source: CBC.

In 2022, in view of high and persistent inflation, the Fed implemented an aggressive series of interest rate hikes, resulting in a strong international US dollar. As a consequence, the NT dollar fell against the US dollar even to below 32 in October. Subsequently, owing to the inflation in the US showing signs of easing, along with the news of the Fed's possible slowdown in the pace of interest rate hikes, the NT dollar reversed and rebounded to 30.708 against the US dollar at the end of 2022, depreciating by 9.83% from the end of the previous year. At the beginning of 2023, the NT dollar continued its uptrend but reversed later to end April at 30.740, depreciating by 0.10% compared to the end of 2022 (Chart 1.9). Moreover, in 2022, affected by declining exports in the second half of the year, together with continued foreign capital outflows, the nominal effective exchange rate (NEER) index of the NT dollar weakened and registered 100.88 at the end of the year. Nevertheless, in early 2023, underpinned by a significant foreign capital inflow aiming to buy Taiwanese stocks, the NEER of the NT dollar rebounded to 101.47 at the end of March.

Volatility in the NT dollar exchange rate against the US dollar shifted between 1.33% and 8.18% in 2022 and registered an annual average of 3.89%. During January to April 2023, the volatility shrank and registered between 1.81% and 6.04% (Chart 1.9). Compared to major currencies such as the Japanese yen, the euro, the Singapore dollar, and the Korean won, the NT dollar exchange rate has stayed relatively stable against the US dollar.

Chart 1.10 NPLs of domestic banks

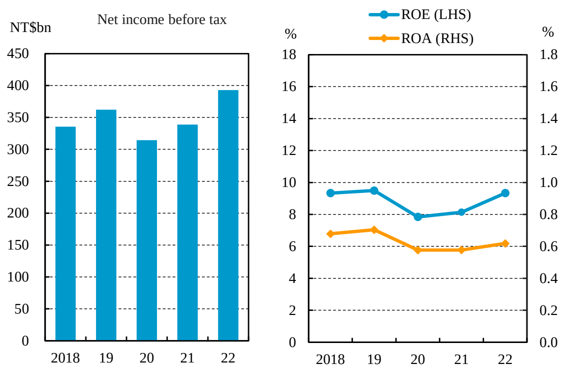


Note: Excludes interbank loans.
Source: CBC.

Financial institutions

Domestic banks' asset quality strengthened and profitability reached a nearly 20-year high, while the average capital adequacy ratio declined marginally

Chart 1.11 Profitability of domestic banks



Notes: 1. ROE = net income before tax/average equity.
2. ROA = net income before tax/average total assets.
Source: CBC.

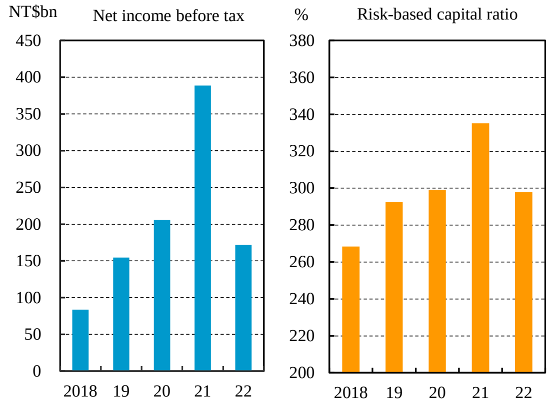
Growth in customer loans of domestic banks decelerated in 2022, while the credit concentration in corporate loans slightly increased. However, the share of real estate-secured credit edged down. The average NPL ratio saw a decline to 0.15% at the end of the year (Chart 1.10), reflecting an improvement in credit quality, and the provisions for loan losses remained sufficient. Meanwhile, the exposures of domestic banks to China as a percentage of net worth continually reached a new low of 26% at the end of 2022. Nevertheless, the potential economic and financial risks in China are still elevated, which warrant constant close attention.

Benefiting from a substantial pickup in net interest income owing to wider spreads between deposit and loan interest rates, the net income before tax for domestic banks in 2022 increased by 15.97% over the previous year to NT$392.8 billion, a record high in nearly 20 years (Chart 1.11, left panel). The average return on equity (ROE) and the return on assets (ROA) also went up to 9.33% and 0.62%, respectively, indicating ascending profitability (Chart 1.11, right panel). Although the average capital adequacy ratio slightly dropped to 14.68% at the end of

2022, the capital quality of domestic banks remained satisfactory.

Life insurance companies' profitability and average RBC ratio slumped

Chart 1.12 Net income before tax and risk-based capital ratio of life insurance companies



Note: Figures for risk-based capital ratios exclude insurance companies taken into receivership by the FSC.
Source: FSC.

Life insurance companies reported net income before tax of NT$171.9 billion in 2022, a substantial year-on-year decrease of 55.75% from a year earlier (Chart 1.12, left panel). This mainly resulted from a huge reduction in investment revenue amid a slump in international stock and bond markets. The average risk-based capital (RBC) ratio also decreased to 297.82% at the end of the year (Chart 1.12, right panel). The average equity to asset ratio[10] fell to a low of 2.66% in the end of September 2022, but then climbed to 5.11% at the end of the year.

Foreign portfolio positions of life insurance companies grew continually and reached NT$21.19 trillion at the end of 2022. However, since the volatility in stock markets mounted and global bond yields remained high, life insurance companies still faced higher equity risk and interest rate risk. The FX risk inherent in large-value open FX positions should also be reckoned with. Furthermore, the premium income markedly reduced by 21.43% in 2022, and the life insurance benefit payment has exceeded premium income since July 2022, which could put pressure on life insurance companies' cash flows.

Moreover, in 2022, the total assets of non-life insurance companies contracted, and they reported net income before tax of minus NT$190.5 billion owing to a drastic increase in coronavirus disease 2019 (COVID-19) insurance claim settlements. Correspondingly, the average RBC ratio trended downwards to 231.30% at the end of the year from 466.12% a year earlier. Looking into 2023, pressure on insurers' claim settlements is expected to be eased.

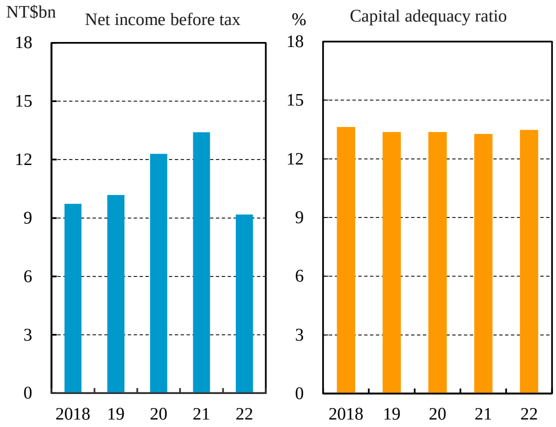
Bills finance companies' guarantee business shrank along with a substantial reduction in profitability and high liquidity risks

CP guaranteed by bills finance companies went down by 13.12% year on year in 2022, and the

[10] Assets are exclusive of the assets of insurance products in separate accounts.

guaranteed advances ratio trended upwards to 0.16%. However, the credit quality of CP guarantees was still satisfactory.

Chart 1.13 Net income before tax and capital adequacy ratio of bills finance companies



Source: CBC.

The net income before tax of bills finance companies reduced by 31.54% year on year to NT$9.2 billion in 2022 (Chart 1.13, left panel), owing to an increase in interest expenses and a decrease in gains on disposal of financial assets. The average capital adequacy ratio bounced back to 13.48% at the end of 2022 (Chart 1.13, right panel), and the ratio for each company remained well above the statutory minimum of 8%. Nevertheless, bills finance companies still faced a significant maturity mismatch between assets and liabilities. Although the liquidity risk declined, it was still at a relatively high level.

Financial infrastructure

Domestic payment systems functioned smoothly, and consumption via non-cash payment instruments expanded

The CBC Interbank Funds Transfer System (CIFS) functioned smoothly in 2022, settling funds worth a total of 23.6 times the GDP for the year. The total transaction values processed by the Interbank Financial Information System (IFIS) also increased by 4.32% compared to 2021. The overall consumption expenditure via a variety of non-cash payment tools[11] rose by 12.92%, mainly attributed to rising demand for contactless payments amid the pandemic and an improvement in convenience of mobile payments. Additionally, a shared platform for cross-institution e-payments, established by the Financial Information Service Co., Ltd. (FISC) to meet the Bank's expectation, has been covering e-payments for taxes and utility bills from 2022 onwards and is expected to provide a payment service for shopping in 2023 Q3. Last but not least, triggered by multiple risk events, the crypto asset market remained highly volatile in 2022. In this vein, the FSC expressed intention to implement appropriate monitoring of crypto assets in a gradual manner.

[11] Non-cash payment tools include credit cards, debit cards, electronic tickets, electronic payment accounts, and ACH interbank collection.

Other measures to strengthen the financial system

To support the government's 2050 net-zero transition plan, the Bank formulated *The Bank's Strategic Plan on Climate Change* and released it on December 30, 2022. For the same purpose, the FSC also continued to promote the Green Finance Action Plan 3.0, aiming to strengthen financial institutions' management of climate-related risks and disclosure of greenhouse gas (GHG) emission information, and formulated the Taiwan Sustainable Taxonomy. Furthermore, while some insurers reclassified their financial assets to mitigate the impact of large fluctuations in interest rates on their balance sheets, the FSC required them to set aside a provision to special capital reserves and reinforce corporate governance to ensure sustainable and sound operations of these insurers. As for the financial landscape, the Bank compiled the Taiwan financial vulnerability index (TFVI) to evaluate the vulnerability dynamics of the domestic financial system. Finally, the Bank continually reviewed FX regulations, such as revising the *Directions Governing Banking Enterprises for Operating Foreign Exchange Business*, so as to strengthen the administration of foreign currency exchange counters (FCEC) and clarify the matters of FX settlement declarations for legal entities.

Measures to promote financial stability

Measures undertaken by the Bank and the FSC to promote financial stability

Measures undertaken by the Bank to promote financial stability

From 2022 onwards, in order to cope with high domestic inflation, the Bank raised the policy rates five times by a total of 0.75 percentage points and edged up the reserve requirement ratios on NTD deposits twice by a total of 0.5 percentage points. These policies could help restrain domestic inflation expectations, maintain price stability and foster sustainable economic development. Apart from that, considering international and domestic economic and financial conditions, the Bank conducted open market operations and managed reserve money at an appropriate level by issuing NCDs.

Moreover, the Bank adjusted targeted macroprudential measures four times from December 2020 onwards and implemented a tightened monetary policy in a gradual manner to strengthen the effectiveness of real estate measures. The Bank also continually adopted flexible FX rate policies and undertook appropriate FX management measures (such as reinforcing off-site monitoring efforts to ensure that forward transactions are based on genuine needs and urging authorized FX banks to enhance their exchange rate risk management) to safeguard the dynamic stability of the NT dollar exchange rate and maintain FX market order, thus ensuring sound financial development.

Measures undertaken by the FSC to maintain financial stability

For the sake of addressing the impact stemming from claims of COVID-related policies and the Fed's rapid interest rate increases on the insurance industry, the FSC announced that the deferred income tax assets resulting from the losses of the aforementioned policies could be fully recognized as regulatory capital. Furthermore, the implementation of the original plan for insurers to take capital charges against the risks arising from terrorist attacks, communicable diseases, and credit guarantees except for natural events, will be postponed. Last but not least, the FSC amended the *Regulations Governing Capital Adequacy of Insurance Companies* and relaxed the restriction on the issuance of long-term corporate bonds for insurers.

In addition, in response to increased volatility in domestic stock markets, the FSC consecutively adopted related measures to stabilize the markets from July 2022 onwards. Afterwards, with global and domestic stock markets stabilizing, the FSC removed the aforementioned policies in February 2023 and resumed normal market administration. Finally, the FSC adopted other supervisory measures as well, including strengthening the corporate governance of financial institutions and reinforcing information security so as to maintain financial stability.

The Bank will continue to adopt measures to promote financial stability when necessary

In 2022, despite the adverse macro environment amid major central banks' rapid tightening of monetary policies and a slowdown in global economic growth, profitability of Taiwan's banking industry and bills finance companies remained satisfactory with adequate capital levels. While the insurance industry faced somewhat bigger headwinds, capital increases and other measures were taken to address the adverse impacts. Furthermore, financial markets and financial infrastructure functioned well and developed steadily. Overall, Taiwan's financial system remained largely stable. The Bank will continue to adopt appropriate monetary, credit and foreign exchange policies. Meanwhile, the FSC revamped financial regulations and enhanced financial supervisory measures to facilitate sound operations of financial institutions and maintain financial stability.

Looking ahead, the reopening of the Chinese economy and the ongoing Russia-Ukraine conflict may exert upward pressure on commodity prices, thus influencing the degree of inflation moderation in major economies. Furthermore, the escalating US-China technology dispute poses a potential risk to the recovery of the Chinese economy. Moreover, factors such as the tightening of monetary policies by the Fed and European central banks, along with corresponding spillover effects, growing uncertainty in commodity supplies resulting from climate change, and escalating geopolitical risks, could cause global inflationary pressures to persist, intensify financial market volatility, and heighten downside risks to the global economy. Against this backdrop, the Bank will continue to pay close attention to the impacts of relevant subsequent developments on domestic economic and financial conditions and take appropriate response measures in a timely manner, thus promoting financial stability.

II. Potential macro environmental risk factors

2.1 International economic and financial conditions

2.1.1 International economic conditions

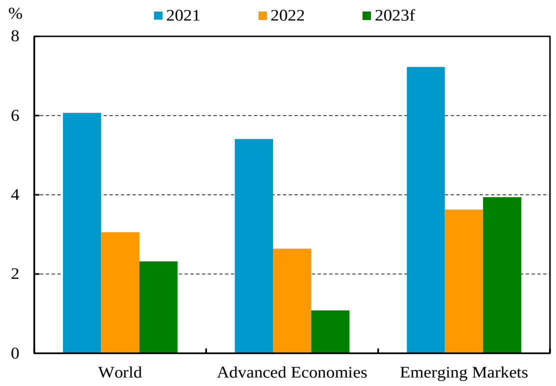
The deteriorating global inflation trends triggered by the Russia-Ukraine war in 2022, coupled with a larger-than-expected economic downturn in China, posed significant obstacles to global economic growth. To curb rising inflation, the central banks of major economies accelerated their interest rate hike cycles, resulting in spillover effects that tightened international financial conditions and accelerated the decline in global economic growth.

Looking ahead to 2023, the withdrawal of China's zero-COVID policy is expected to boost the global economy. However, tightened financial conditions, high geopolitical risks, and potential downside risks faced by the US and European economies all point to a continued slowdown in global economic growth. Furthermore, with the decline in commodity prices, cooling demand, and improvements in supply chain conditions, global inflationary pressures are expected to ease slightly but remain elevated.

Global economic growth slows significantly

In 2022, the Russia-Ukraine war caused supply shortages and a surge in commodity prices, exacerbating global inflationary pressures. Additionally, China's zero-COVID policy intensified the strains on global supply chains, resulting in a larger-than-expected economic slowdown domestically and creating significant hurdles for global economic growth. Moreover, major central banks tightened monetary policies to combat rising inflation, leading to spillover effects that not only resulted in tighter financial conditions

Chart 2.1 Global economic growth rates



Note: Figures for 2023 are S&P Global Market Intelligence estimates.
Source: S&P Global Market Intelligence (2023/5/15).

internationally but also hastened the global economic downturn. Consequently, the economic growth rate experienced a sharp deceleration, dropping to 3.1% (Chart 2.1).

Looking ahead to 2023, the reopening of China's economy and the sustained economic expansion of other major Asia-Pacific economies are expected to bolster the global economy and trade. Nonetheless, the negative effects of tightening monetary policies by major central banks are gradually emerging. Furthermore, the persistence of geopolitical risks, such as the Russia-Ukraine war, and the sluggish growth momentum of the US and European economies will further impede global economic growth. In addition, the financial sector turmoil in the US and Europe in March 2023 added additional downside risks to the already fragile global economy. S&P Global estimates[12] that the global economic growth rate will decline to 2.3% in 2023. For advanced economies, growth is projected to substantially drop to 1.1%, while emerging economies are expected to demonstrate a slight rebound to 3.9% (Chart 2.1).

China's economy is set for a strong rebound as the zero-COVID policy ended

In 2022, China's zero-COVID policy had a more negative impact on the economy than anticipated, with the annual economic growth rate sharply declining to 3.0%, falling short of the initial target of 5.5%. Looking ahead to 2023, the policy focus is expected to shift from zero-COVID towards stimulating economic recovery through several measures, such as credit policies, infrastructure investments, loosening restrictions on the real estate sector, and easing regulatory oversight on the technology industry. Given the clear policy stance on stabilizing economic growth, S&P Global predicts that the economic growth rate of China will rebound to 5.5% throughout the year.

In terms of fiscal condition, with the phase-out of the zero-COVID policy at the end of 2022, China is set to continue pursuing an expansionary fiscal policy in 2023 to stabilize economic growth. Alongside maintaining tax cuts and fee reductions, the fiscal deficit-to-GDP target will be raised to 3%, and the issuance of local government special bonds will be expanded to RMB3.8 trillion, reflecting a more accommodative fiscal policy. The IMF forecasts that China's government debt-to-GDP ratio will keep rising, reaching 82.4% in 2023.[13]

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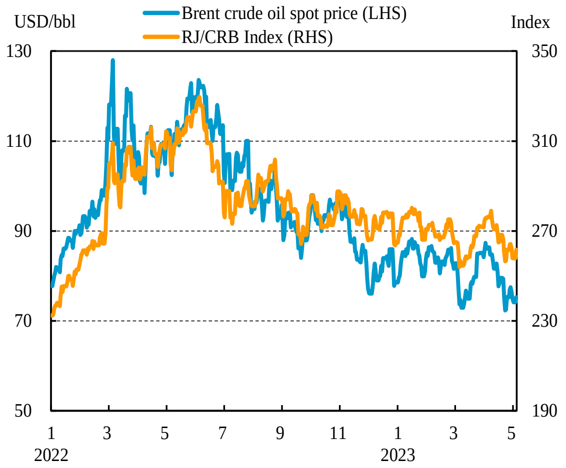
[12] S&P Global Market Intelligence estimate on May 15, 2023.
[13] IMF (2023), *Fiscal Monitor*, April.

Global inflation moderated, but remained at elevated levels

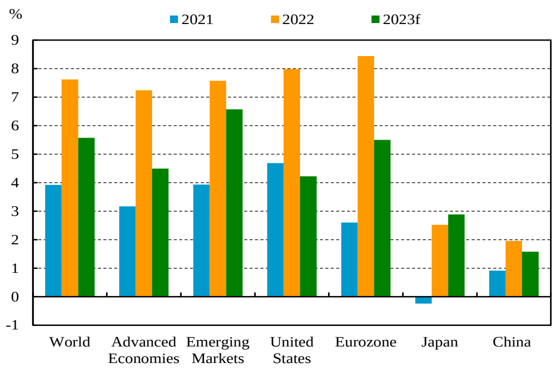
In 2022, the Russia-Ukraine conflict worsened global inflation and led to a sharp rise in prices of European natural gas and international oil, which had significant impacts on the global economy. China's zero-COVID policy further exacerbated tensions in supply chains. In early March, the price of Brent crude oil peaked at a new high since 2008 of US$128 per barrel, representing an increase of over 60% from the US$77.78 per barrel at the beginning of the year. The R/J CRB Index, designed to track global commodity prices, also witnessed a substantial surge (Chart 2.2). As a result, the global CPI inflation rate skyrocketed to a peak of 8.3% year-on-year in September 2022. Afterwards, the rate saw a decline but its annual growth rate throughout the year still reached 7.6%, significantly higher than the 3.9% in 2021. Among countries, advanced economies and emerging economies saw increases of 7.2% and 7.6%, respectively (Chart 2.3).

Chart 2.2 Global commodity prices



Source: Bloomberg.

Chart 2.3 Global headline inflation indices

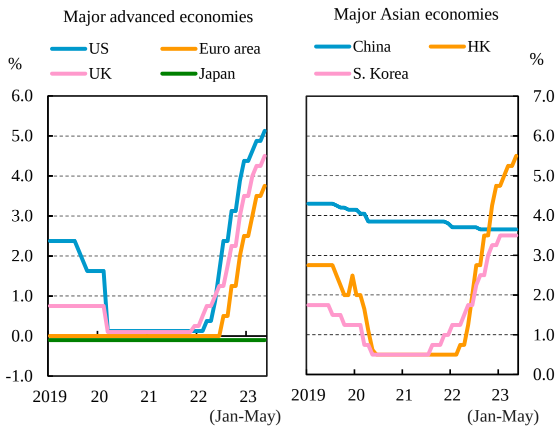


Note: Figures for 2023 are S&P Global Market Intelligence estimates.
Source: S&P Global Market Intelligence (2023/5/15).

In 2023, as the global pandemic eased, national governments successively withdrew relevant fiscal and monetary stimulus measures. This, coupled with tightening global financial conditions, weak demand, and a noticeable easing of supply chain bottlenecks, led to a gradual alleviation of global inflationary pressures. S&P Global predicts that the global CPI annual growth rate will come down to 5.6% from 7.6% in 2022 but remain high. Among countries, advanced economies and emerging economies are expected to see decreases to 4.5% and 6.6%, respectively (Chart 2.3).

The recent fallout of the banking turmoil in the US and Europe has induced financial tightening. Considering this, coupled with ongoing global inflationary pressures, the impact of the future trajectory of interest rate hikes or monetary policy stances by major central banks in response to the global inflation outlook warrants close attention. Moreover, climate change heightens uncertainty surrounding commodity supply and disrupts supply chains, which could contribute to the risk of a second wave of inflation and should not be underestimated.

Chart 2.4 Policy rates in major economies



Notes: 1. Advanced economies: figure for the US is based on the median of the federal funds rate target range; for the euro area, the interest rate on the main refinancing operations; for the UK, Bank Rate; for Japan, interest rate on banks' excess reserves.
2. Emerging Asia: figure for China is based on one-year loan prime rate; for Hong Kong, Base Rate; for South Korea, Base Rate.
3. Figures are as of May 15, 2023.

Sources: Central banks and monetary authority websites.

Major central banks tightened monetary policies to curb inflation

Since the second half of 2022, the inflation rate has surged significantly owing to the ongoing Russia-Ukraine conflict. In response, major economies' central banks ended their accommodative monetary policies introduced during the pandemic and accelerated the pace of monetary tightening to curb inflationary pressures. Among them, the Fed raised its target band for the federal funds rate seven times by a total of 3.5 percentage points (pps) to 5.00%-5.25% from July 2022 to May 2023, along with an ongoing tapering. However, in March 2023, in order to mitigate potential systemic risks stemming from the collapse of Silicon Valley Bank (SVB), the Bank Term Funding Program (BTFP)[14] was initiated to provide market liquidity.

The European Central Bank (ECB) has raised its main interest rates seven times since the second half of 2022, totaling 3.75 pps, in response to persistently high inflation. Furthermore, from March 2023 onwards, the ECB has gradually shrunk the scale of its asset purchase program on a monthly basis. Similarly, the Bank of England (BoE) has increased its Bank Rate seven times from August 2022 to May 2023 by a total of 3.25 pps to 4.5% in view of rising domestic prices. Apart from a temporary open market operation where long-term UK government bonds were purchased, the BoE has continued to scale back its bond-buying stimulus plan. As for Japan, thanks to relatively mild domestic inflationary pressures, the Bank of Japan (BOJ) maintained an accommodative monetary policy without adjusting its policy interest rates (Chart 2.4).

[14] Eligible depository institutions that meet the criteria can pledge US Treasury securities and agency mortgage-backed securities as collateral to the Fed, which will be valued at par, to apply for loans with a term of up to one year.

Among Asian economies, China continued its accommodative monetary policies to stimulate the real economy. Since the second half of 2022, the People's Bank of China (PBOC) has successively reduced the reserve requirement ratio for financial institutions, the reserve requirement ratio for foreign currency deposits, and the loan prime rate. Meanwhile, in response to the persistently high domestic inflation rate and inflation expectations, the Bank of Korea raised its policy rate five times, totaling 1.75 pps, to 3.5% with the aim of preventing high inflation from becoming deeply entrenched. The Hong Kong Monetary Authority, for the purpose of maintaining effective operation of a linked exchange rate system, has raised the policy rate by a total of 3.5 pps since July 2022 following the Fed's rate hikes (Chart 2.4).

Given that the sharp interest rate hikes by central banks in the US and Europe, triggering tighter financial conditions and a decline in asset prices, led some banks to experience turmoil, there will be a trade-off between combating inflation and ensuring financial stability for the monetary tightening trajectory among major central banks. This could amplify the uncertainty of monetary policy and warrants close attention.

2.1.2 Global financial conditions

In the first three quarters of 2022, most central banks adopted tighter monetary policies to curb inflation, which resulted in significantly tighter financial conditions in advanced economies. Nonetheless, the aforementioned financial conditions have eased somewhat since 2022 Q4, driven by more stable stock and bond markets, as well as market expectations of a slower pace of monetary policy normalization from major central banks. Subsequently, a tightening of financial conditions resurged when a series of turmoil in several US and European banks erupted in March 2023.

Looking ahead to 2023, several factors warrant close attention as they could exacerbate global financial instability, including the spillover effects of the turmoil in the US and European banking system, subsequent developments in the real estate market and higher local government debt in China, and further escalation of risks related to geopolitical tensions and climate change.

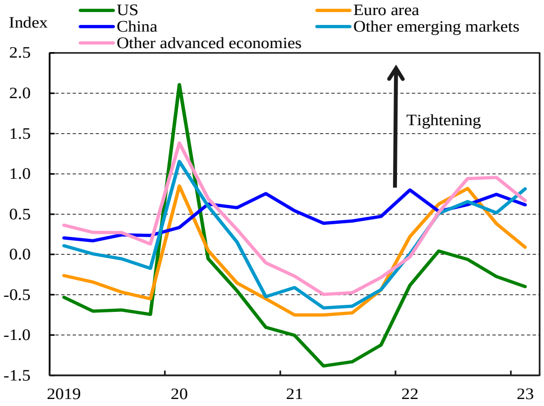
Financial conditions eased

In the first three quarters of 2022, despite cooling economic activity in major economies like Europe and the US, inflation rates remained stubbornly high. This prompted central banks such as the Fed to accelerate the pace of monetary policy tightening, leading to a faster tightening of financial conditions in advanced economies. However, China continued to adopt a loose monetary policy in order to mitigate the negative impacts stemming from its zero-COVID policy and the rapid deterioration of the real estate market on economic growth. As a result, financial conditions in China remained accommodative.

From 2022 Q4 onwards, investors' anticipation of major central banks slowing down their rate hikes has led to a rebound in stock markets and lower bond yields. Therefore, global financial markets have gradually recovered, and the financial conditions in both the US and the Euro area have also moderately loosened (Chart 2.5).

However, in March 2023, financial conditions tightened sharply in Europe and the US owing to surging stock market volatility triggered by the fallout of some US regional banks, such as SVB, and Credit Suisse in Europe. Although financial conditions stabilized afterwards, panic sentiment and a higher level of uncertainty surrounding future developments remain. Therefore, the impact of the turmoil on the global financial landscape is still a matter requiring close attention.

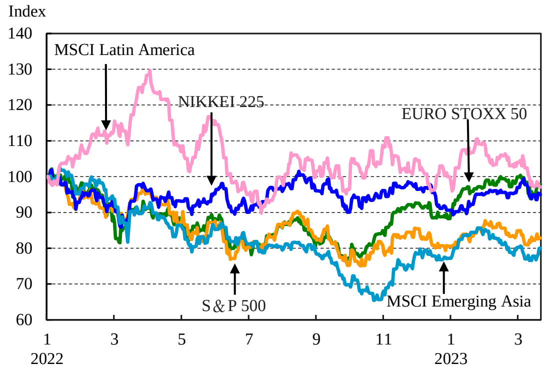
Chart 2.5 Financial conditions indices in major economies



Notes: 1. Financial conditions indices are gauged by standard deviations from the mean. These indices were calculated quarterly from 2006-2019 and monthly after 2020.
2. Other emerging economies exclude Russia, Ukraine, and Turkey.

Source: IMF (2023), *Global Financial Stability Report*, April.

Chart 2.6 Major international equity indices



Notes: 1. January 1, 2022 = 100.
2. The EURO STOXX 50 refers to a stock index consisting of the largest 50 stocks in the 12 major economies of the euro area.

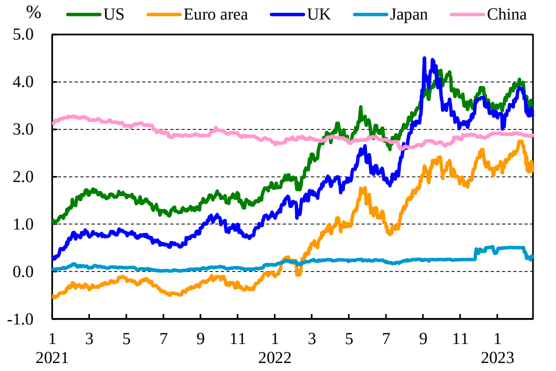
Source: Bloomberg.

Aggressive policy rate hikes by the Fed have jolted global financial markets, and lifted debt risks and capital outflow pressures for emerging markets

In 2022, the rapid rate hikes by the Fed had adverse spillover effects on financial markets and other economies. Accordingly, stock markets around the world saw an evident decline in the first three quarters before a rebound from Q4 as markets anticipated that the Fed might ease up on its pace of tightening (Chart 2.6). With regard to bond markets, except for Japan and China, the 10-year government bond yields in other economies markedly trended upwards following the movement of the US bond market (Chart 2.7). Furthermore, given the notable magnitude of interest rate increases by the Fed, the spread between the US 10-year and 2-year government bond yields, as well as the one between 10-year and 3-month yields, reached negative values, indicating an inverted yield curve, in which longer-term bonds had a lower yield than short-term debt instruments. The inverted yield curve could pose a threat to some financial institutions which face significant maturity mismatches between assets and liabilities, and thus dampen their profitability.

Higher borrowing costs in advanced economies arising from monetary policy tightening has put upward pressure on interest costs of sovereign debt for emerging economies, especially among the group of low-income economies with substantial demand for short-term US dollar funding. Moreover, many of these emerging economies have confronted a deterioration in debt-servicing capacity. If the aformentioned economies do not improve their debt servicing capacity, it could leave them more vulnerable to default and liquidity risks. On top of that, amid recent rising investor risk aversion, emerging economies with weaker macroeconomic fundamentals could face sizable capital outflows in case of a sharp tightening in financial conditions, which warrants close attention.

Chart 2.7 10-year government bond yields in major economies

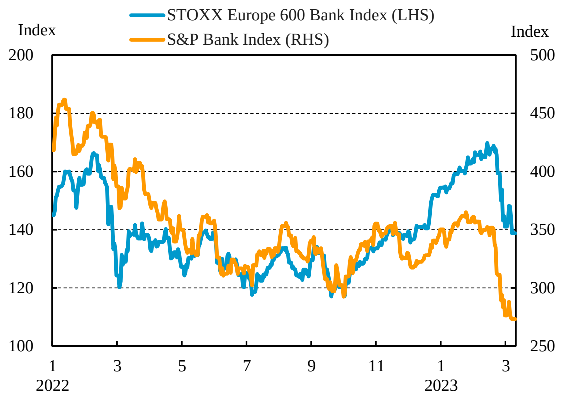


Source: Bloomberg.

Recent turmoil in the US and European banking sector exacerbated global financial vulnerabilities

Since March 2023, a series of banking turmoil in the US and Europe have caused sharp price corrections in the bank equity indices across these regions (Chart 2.8). Credit rating agencies also downgraded the ratings of some US regional banks. The index of Additional Tier 1 (AT1) contingent convertible (CoCo) bonds issued by European banks plummeted as well after the Credit Suisse fallout. To tame the escalation of systemic risks, authorities in the

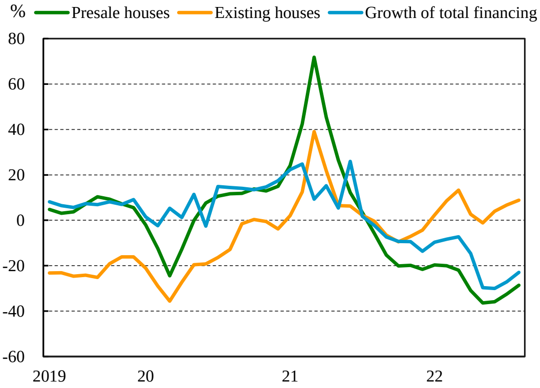
Chart 2.8 Bank equity indices in the US and Europe



Source: Bloomberg.

US and Europe actively took actions to prevent the spread of the turmoil. Six major central banks further increased the frequency of US dollar swap lines for the purpose of strengthening liquidity support to the market (Box 1).

Chart 2.9 Annual growth rates of real estate sales in China



Notes: 1. Year-on-year growth.
2. The data covers the period from May 2019 to August 2022.

Source: IMF (2022), *Global Financial Stability Report*, October.

Although the swift actions taken by central banks temporarily contained market panic, the recent failure of banks in the US and Europe provided evidence that major central banks' ongoing tightening of monetary policy resulted in an environment of tighter financing conditions. Once the banking system experiences liquidity shortfalls, fearful sentiment could spread widely through financial channels. This, in turn, could cause massive bank runs if the banking system faces a loss of confidence, which may further trigger systemic risks amid more significant contagion effects. Correspondingly, global financial vulnerabilities could potentially accumulate.

China's move to ease COVID-19 restrictions brought hope of economic recovery, but funding pressures remained in the real estate market

In 2022, in order to stimulate housing demand, China's authorities continually relaxed regulations governing the real estate market. Nevertheless, the implementation of large-scale lockdowns clouded home sales, with a 28% contraction (Chart 2.9) year on year. In light of the slow progress in completion and delivery of presold properties which impacted home buyers' confidence, financially weaker private developers continued to face funding challenges.

With a still sizable stock of unsold houses and increased fiscal burdens caused by the pandemic, total local government financing vehicle (LGFV) debt reached 50% of China's GDP in 2022. Given the substantial levels of local government debt and the sluggish recovery of the real estate market, financial institutions in China are facing potential threats. If the real estate market remains gloomy or local governments fail to address debt problems in the future, it could incur considerable losses to both investors holding trust products and trust companies. This, in turn, will lead banks to tighten their lending standards owing to mounting non-performing real estate loans, hence exerting pressure on the funding markets. Accordingly, it is worth continuing to monitor the subsequent developments in this regard.

Geopolitical and climate change risks had a greater impact on the financial sector

Financial fragmentation[15] resulting from geopolitical risks, such as Russia's invasion of Ukraine and a spike in tensions between the US and China, could affect cross-border capital allocation, international payment systems, and asset prices. Rising geopolitical tensions would thus cause sudden reversals in cross-border capital flows. These effects are more pronounced for emerging markets and developing economies than for advanced economies. Additionally, a rise in geopolitical tensions between an investing and a recipient country could reduce bilateral cross-border portfolio and bank credit. This, in turn, may lead to higher funding costs for banks, as well as bringing down their profitability and prompting them to contract lending to the corporate sector, and could even undermine macro-financial stability.

Extreme weather events driven by climate change brought about significant economic losses. Physical and transition risks arising from climate change are also reshaping the financial risk landscape through spillover effects and adverse effects between the financial and real sectors, hence they are becoming a potential threat to financial stability. In order to mitigate the impacts of climate change, major economies have been actively promoting policies governing transitions toward net-zero emissions. In spite of these policies, investment in fossil fuels did not see a notable decrease in 2022.[16] Moreover, the ongoing Russia-Ukraine conflict has further pushed up prices of raw materials critical for the green transition, making it more difficult for economies to keep in line with the transition goals of the Paris Agreement. This raises concerns about the heightened financial stability risks generated by climate change, which warrants close attention.

[15] Financial fragmentation refers to situations like disruption in cross-border payments, or capital outflows triggered by a reallocation of cross-border capital.

[16] By the end of 2022, the share of investment in fossil fuels by emerging economies remained above 60%, while in advanced economies this figure was close to 40%. Both of them showed no significant decline compared to the end of 2015.

Box 1
Analysis of recent US and European banking turmoil and the possible effects on Taiwan's financial system

As of March 2023, four small and medium-sized banks in the US had failed or been liquidated one after another. Meanwhile, Credit Suisse had also encountered financial distress. Authorities and bank coalitions in respective countries took proactive measures to prevent the turmoil from spreading globally. This Box explains these incidents and their spillover effects, as well as the relevant authorities' quick response measures and subsequent focus areas. It also analyzes the reasons why these incidents had little impact on the domestic financial system.

1. US and European banking turmoil

1.1 Four small and medium-sized banks in the US collapsed or sought to be wound up, and Credit Suisse became embroiled in financial distress

Both Silicon Valley Bank (SVB) and First Republic Bank (FRB) had problems such as high uninsured deposit ratios and asset-liability maturity mismatches.[1] Suffering from remarkable deposit outflows and inadequate capital levels, they were taken over by the Federal Deposit Insurance Corporation (FDIC) on March 10 and May 1, 2023, respectively. FRB was then acquired by JPMorgan Chase Bank on the same day.

Both Silvergate Bank and Signature Bank experienced a deterioration in their financial and operational conditions owing to substantial deposit withdrawals by investors following the crypto market crash in 2022. Silvergate Bank announced its intent to wind down operations on March 8, and Signature Bank was taken over by the FDIC on March 12, 2023.

In recent years, Credit Suisse has had serious problems recurrently such as material weaknesses in internal control, significant losses, and massive fund outflows. On March 15, 2023, Saudi National Bank, its largest shareholder, refused to sustain investment in new capital to Credit Suisse, causing its stock price to plummet and the five-year credit default swap rate to skyrocket on one occasion. Afterwards, under the guidance of the Swiss authorities, the Union Bank of Switzerland (UBS) acquired Credit Suisse at a nearly 60% discount of its market price in order to avoid the spreading of the turmoil.

1.2 Regulators took prompt countermeasures or bank coalitions provided quick assistance

In order to maintain domestic banks' liquidity, the Fed announced the launch of the Bank Term Funding Program (BTFP) on March 12, 2023, offering loans of up to one year to eligible depository institutions pledging qualifying assets as collateral, which were valued at par.

FRB accessed US$70 billion in funds from the Fed and JPMorgan Chase Bank on March 13 and then received other deposits totaling US$30 billion from 11 major US banks on March 16, 2023. This aid eased FRB's pressure of insufficient funds. However, it was eventually sold to JPMorgan Chase Bank owing to continuous and substantial deposit outflows.

On March 20, six central banks including the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Fed, and the Swiss National Bank increased the frequency of 7-day maturity operations from weekly to daily via standing U.S. dollar liquidity swap line arrangements until the end of April 2023.

2. Spillover effects

2.1 Volatility in financial markets surged

The successive closures of small and medium-sized banks in the US sparked off a sharp drop in stock prices of other banks, such as Western Alliance Bancorporation (WAL), and led to a noticeable decline in regional banking indices.

2.2 Credit rating agencies downgraded the credit outlook on the US banking system

Credit rating agency Moody's lowered its credit outlook on the US banking system from "stable" to "negative" in March 2023. Subsequently, the credit ratings of some US regional banks were also downgraded. Among them, FRB and WAL were downgraded to junk grade owing to their deteriorating financial conditions.

2.3 Reducing the willingness of traditional banks to cooperate with the virtual asset industry

The successive collapse of two major virtual banks, Silvergate Bank and Signature Bank, might reduce the willingness of other traditional banks to cooperate with the virtual asset industry. Additionally, the small-scale startups in the virtual asset industry might encounter difficulties in opening bank accounts, which would hinder the future development of this industry.

3. Subsequent focus areas

3.1 Impact of interest rate hikes by the US and European central banks on international economic and financial conditions

If the central banks in the US and Europe continue to implement significant monetary tightening policies, it may increase the volatility in financial markets, thus reducing disposal gains or amplifying impairment losses of financial institutions' financial assets. As a consequence, the above-mentioned developments may expose the already fragile economies to more risks and lead them toward hard landing concerns, which warrants close attention.

3.2 The public's lack of confidence in the banking system may trigger systemic risks amid greater contagion effects

The successive failures of small and medium-sized banks in the US have raised concerns about the business conditions of other regional banks, such as Pacific Western Bank, which was reported to be sold and saw a slump in its stock price. Furthermore, the turmoil highlights the problem that many banks' deposits are not covered by deposit insurance.[2] Once public confidence in the banking system collapses, even sound banks may be affected. If the contagion effects spread out, they could possibly trigger systemic risks and result in a recurrence of financial turmoil, warranting extra caution.

3.3 Impact of regional banks tightening credit on individuals and small and medium-sized businesses

Regional banks in the US may tighten their credit owing to massive deposit outflows, which could pose adverse impacts on households and businesses. In addition, as small and medium-sized banks' loans account for 38% of total loans in the US banking system, if they suffer from poor performance, it could exert negative effects on US employment and economic growth, increasing downside risks to the economy.

3.4 Fund raising is difficult for startups following the collapse of SVB, which may be unfavorable for the future development of the startup industry

The failure of the startup-friendly bank SVB has raised concerns about broader shocks on the US technology industry. Although the financing needs of startups have increased, it is difficult for them to acquire funds through initial public offerings. This situation, for small-scale startups, may lead to operational predicaments and be unfavorable for the future development of the US startup industry.

3.5 US regulatory authorities strengthened their efforts in banking supervision, which may further tighten the financial situation

The incidents prompted regulatory authorities to review their supervisory intensity on medium-sized banks. In the future, if regulatory authorities strengthen their monitoring of interest rate risks on banks' balance sheets and incorporate them into capital adequacy requirements, it may further tighten the financial situation.

3.6 Full write-down of Credit Suisse's AT1 bonds sparked a controversy, which may strike the CoCo bond market

The recent controversy over the priority of loss absorption between Credit Suisse's shareholders and AT1 bondholders may lead to a re-evaluation of AT1 bonds. This increases the funding costs of CoCo bonds in the market, reducing banks' willingness to issue the bonds, which is thereby detrimental to market development. In addition, regulatory authorities will also need to review the management of capital adequacy provisioning for CoCo bonds in the future.

4. Effects on the domestic financial system

4.1 Domestic stock markets were not significantly affected, and financial institutions' exposure to the four failed American banks and Credit Suisse was still manageable

Affected by the market concerns surrounding the recurrence of financial turmoil and the impairment losses of financial institutions' exposure, the TWSE Finance and Insurance Index briefly declined, dragging down the TAIEX of the TWSE market. Nonetheless, after US and Swiss authorities quickly intervened, which then boosted European and American stock markets, domestic stock markets rebounded and were not significantly affected. According to the statistics of the FSC, domestic financial institutions' exposure to the four failed American banks, including SVB, Silvergate Bank, Signature Bank, and FRB, and Credit Suisse was NT$410 million and NT$155.6 billion, respectively, as of the end of February 2023. The above-mentioned exposure was still manageable and none of them invested in Credit Suisse's AT1 bonds.

4.2 Financial conditions of domestic banks remained sound and the capability to withstand adverse shocks increased

The net income before tax of domestic banks in 2022 reached NT$392.8 billion, the highest level in the past 20 years, and the average NPL ratio dropped to a record low of 0.15%, suggesting satisfatory asset quality. All capital ratios of domestic banks were above statutory minimum standards, and the average liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) were much higher than the minimum requirement of 100%, indicating the overall financial conditions of domestic banks remained sound.

4.3 The asset-liability structure of domestic banks differs from that of the failed banks such as SVB, reflecting that their operations were relatively stable

Taiwan's domestic banking units (DBUs) primarily rely on stable funding sources such as personal and business deposits. There is less credit concentration in a single type of customer, and the ratio of the depositors covered by the maximum deposit insurance of NT$3 million reaches 98.01%. In contrast, SVB's deposit customers were concentrated in startups, and the proportion of deposits which was not covered by deposit insurance accounted for 86% of total deposits. As for the uses of domestic banks' assets, customer loans made up the largest share with 57.07%, and the proportion of investments was not high. Therefore, domestic banks were less affected by international financial markets. On the other hand, SVB allocated nearly 57% of its funds to long-term bond investments (Table B1.1), leading it to become susceptible to substantial valuation losses in financial assets when US interest rates reversed to rise rapidly.

Table B1.1 Asset-liability structure between Taiwanese banks and SVB

Unit: %

Domestic Banks				SVB			
Assets		Liabilities and Equity		Assets		Liabilities and Equity	
Cash	6.64	Customer deposits	79.46	Cash	6.52	Customer deposits	81.74
Investments	27.83	Other liabilities	13.13	Investments	56.68	Other liabilities	10.57
Customer loans	57.07	Equity	7.41	Customer loans	34.76	Equity	7.69
Other assets	8.46			Other assets	2.04		

Notes: 1. Figures are as of the end of 2022.
2. Domestic banks' cash included cash, cash equivalents, and cash due from banks, while SVB's cash contained cash and cash equivalents.
3. SVB's investments included available-for-sale securities (12.31%), held-to-maturity securities (43.12%), and non-marketable and other equity securities (1.25%).

Sources: SVB and CBC.

4.4 The interest rate hike path in Taiwan has been steady, which differs from the accelerated rate hikes in the US

Considering that inflation in Taiwan remained relatively moderate compared to the US and Europe, the Bank was able to raise the policy rates progressively without triggering drastic volatility in the domestic bond market. Furthermore, this gave domestic banks ample time to adjust their asset-liability structure, resulting in an expansion of the average interest rate spread between deposits and loans,[3] making the profit of domestic banks in 2022 rise to the highest level in the past 20 years.

4.5 The Bank will provide sufficient liquidity to the domestic financial system when necessary

If international incidents in the future trigger abnormal capital outflows from the domestic financial system, the Bank will fully support the liquidity of financial markets, including extending the scope of repurchase operations established during the global financial crisis,[4] to provide necessary funds for financial institutions.

5. Conclusion

The recent bank failures in the US and the financial turmoil in Credit Suisse were attributed to individual bank-specific factors. Although the US and the Swiss authorities took swift and decisive actions to avoid the spreading of bank turmoil, many uncertainties still exist in the future. The aftermath of these incidents potentially impacts the interest rate path of major economies, macroeconomic conditions, credit supply, financial regulatory intensity, public confidence in the banking system, and so on, warranting continual close attention.

In addition, domestic banks' financial conditions remain sound, and their operation model differs from banks like SVB and Credit Suisse, indicating that they are not highly involved in cryptocurrency transactions. Moreover, with the steady interest rate hike path by the Bank, domestic banks benefited from an expansion of the average interest rate spread between deposits and loans in 2022, resulting in the highest profitability in the past 20-years. Overall, the domestic financial system is not expected to have systemic risks. The Bank will continue to pay close attention to the impacts of relevant subsequent developments and employ appropriate policy tools to promote financial stability in Taiwan.

Notes: 1. According to Fitch Solutions, SVB and FRB had uninsured deposit ratios of 86% and 68%, respectively, significantly higher than the ratios of JPMorgan Chase Bank (43%), Citibank (43%), and Wells Fargo Bank (51%) at the end of 2022. Meanwhile, the sums of loan-to-deposit and investment-to-deposit ratios for SVB and FRB were 109% and 112%, respectively, also higher than the ratios of JPMorgan Chase Bank (91%) and Citibank (85%).

2. Jiang et al. (2023) indicated that among the 190 US banks each with total assets over US$300 billion, even if only half of the uninsured deposits were withdrawn, without intervention from regulatory authorities, the remaining assets valued at market prices might be insufficient to support the withdrawals of insured deposits, which was estimated to exceed US$250 billion. Please see E.X. Jiang, G. Matvos, T. Piskorski, and A. Seru (2023), "Monetary Tightening and US Bank Fragility in 2023: Mark-to-Market Losses and Uninsured Depositor Runs?" *Stanford Institute for Economic Policy Research Working Paper* No. 23-13, March.

3. The interest rate spread between deposits and loans of domestic banks at the end of 2022 notably elevated to 1.36% (after interest rate hikes by the Bank) from 1.24% (before interest rate hikes) at the end of 2021.

4. The Bank's repurchase operations include "regular repurchase operations" and "extended repurchase operations." The extended repurchase operations enlarge the scope of eligible counterparties including banks, bills finance companies, Chunghwa Post Co., securities firms, and insurance companies. The repurchase period could be up to180 days.

2.2 Domestic macro environment

2.2.1 Domestic economic and fiscal conditions

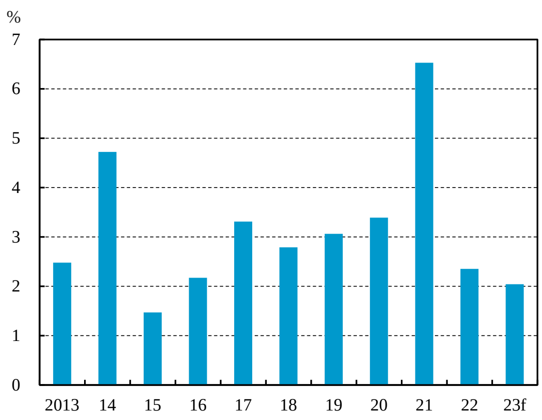
Export growth slowed down in 2022; however, benefiting from steady growth in private consumption and investment, domestic economic growth was still stable. Although domestic prices were high, inflation remained relatively moderate compared to other countries. External debt servicing capacity stayed robust on the back of a persistent surplus in the balance of payments and ample FX reserves. Moreover, fiscal surpluses and outstanding public debt within a manageable level were conducive to weathering uncertainties surrounding international political and economic conditions and maintaining economic growth momentum.

Taiwan's economy grew steadily

In 2022, as domestic epidemic prevention and control measures were gradually relaxed, domestic consumption returned to normal, and private consumption kept expanding. Coupled with steady investment growth, domestic demand continued to be the main driving force for economic growth. The annual economic growth rate reached 2.35% (Chart 2.10),[17] indicating that Taiwan's economy grew steadily.

Looking ahead to 2023, economic growth is anticipated to slow in the first half of the year owing to weak exports and private investment. Although investment momentum is forecast to remain sluggish in the second half of the year, export momentum is expected to gradually recover thanks to reduced inventory levels in global supply chains. Besides this, steady private consumption and government initiatives to enhance "post-pandemic economic and social resilience and national sharing economy achievement" will likely be conducive to domestic demand. As a result, economic growth is expected to pick up. However, considering persistent weakness in global final demand, which could restrain Taiwan's international trade momentum, the DGBAS

Chart 2.10 Economic growth rate in Taiwan



Note: Figure for 2023 is a DGBAS forecast released on May 26, 2023.
Source: DGBAS.

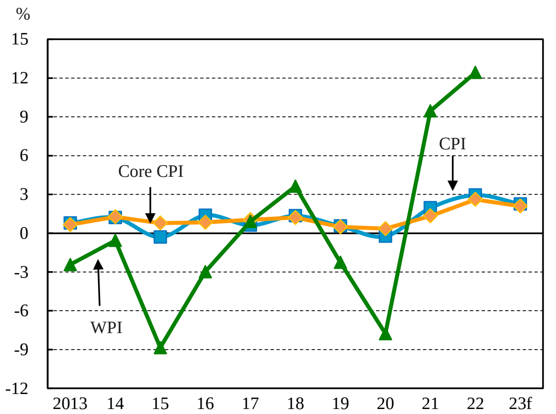
[17] See Note 2.

revised down the annual economic growth rate forecast to 2.04% (Chart 2.10).[18]

Although domestic prices were still-elevated, inflation remained relatively moderate compared to other countries

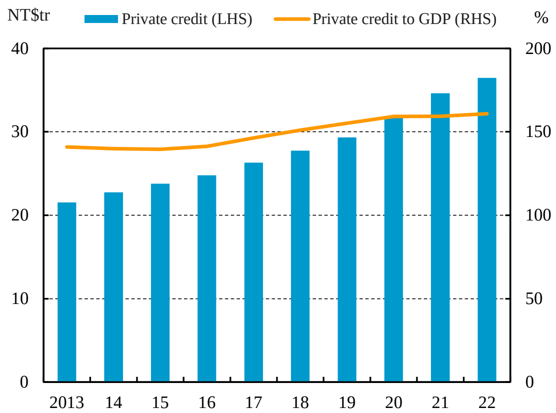
On account of hikes in international crude oil and raw material prices, annual wholesale price index (WPI) inflation ascended progressively to 12.43% in 2022, and annual producer price index (PPI)[19] inflation registered 10.51%. Nevertheless, in April 2023, annual PPI inflation dropped to 1.98%. With regard to consumer prices, owing to the impact of energy and food prices, annual CPI inflation rose to 2.95% in 2022 from 1.97% a year earlier, and reached a 14-year high. Core CPI inflation, which excludes fruit, vegetables, and energy, also gradually increased to 2.61% (Chart 2.11). However, compared to major economies, inflation in Taiwan remained relatively moderate.[20] In April 2023, annual CPI inflation dropped to 2.35%, while annual core CPI inflation continued to increase to 2.72%.

Chart 2.11 Consumer and wholesale price indices (% change, yoy)



Notes: 1. Figures for Core CPI in 2023 are CBC forecasts released on March 23, 2023; other figures are DGBAS statistical data and a forecast released on May 26, 2023.
2. From January 2023, DGBAS discontinued the calculation of the WPI to align with international practices.
Sources: DGBAS and CBC.

Chart 2.12 Private credit provided by financial institutions



Sources: DGBAS and CBC.

Looking ahead to 2023, considering the ongoing effects of monetary policy tightening by major central banks worldwide and the decline in international energy prices, the Bank forecasted in March 2023 that the annual CPI and core CPI inflation rates in 2023 would both ease to 2.09%. Furthermore, taking into account the elevated prices of various domestic

[18] See Note 2.
[19] Considering that the WPI is calculated as a weighted average of three price indices: domestic sales, exports, and imports, including both domestically produced and imported goods, as well as information on price changes in business output and input, it is acknowledged that the WPI lacks clear economic significance and can be prone to misuse. Therefore, starting from January 2023, the DGBAS discontinued the calculation of the WPI and introduced the PPI to align with international practices and facilitate cross-country comparisons for users.
[20] Compared to major economies, Taiwan's annual CPI inflation in 2022 was 2.95%, which was significantly lower than the United States (8.02%), the EU (8.36%), the United Kingdom (9.05%), South Korea (5.05%), and Singapore (6.07%). However, it was higher than Japan (2.37%) and China (1.96%).

services, the DGBAS revised the predicted CPI annual inflation rate of 2023 upward to 2.26% in May.

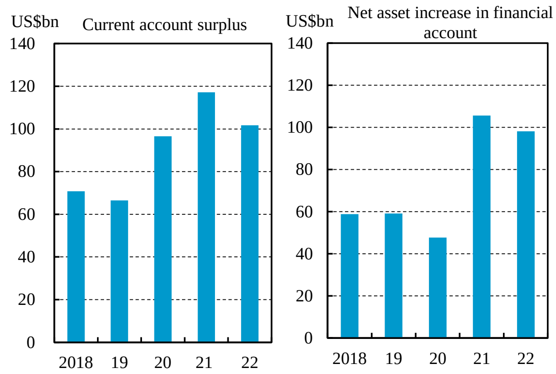
Credit to the private sector increased continually

Private credit[21] to private enterprises and households provided by domestic financial institutions kept growing in 2022, reaching NT$36.45 trillion at the end of the year, an increase of 5.25% year on year, which exceeded the economic growth rate of 2.35% in the same year. The ratio of credit to GDP registered 160.82%, slightly higher than 159.31% as compared to a year earlier (Chart 2.12). This showed that the credit provided by domestic financial institutions was sufficient to support economic activity.

Current account sustained a surplus and FX reserves stayed ample

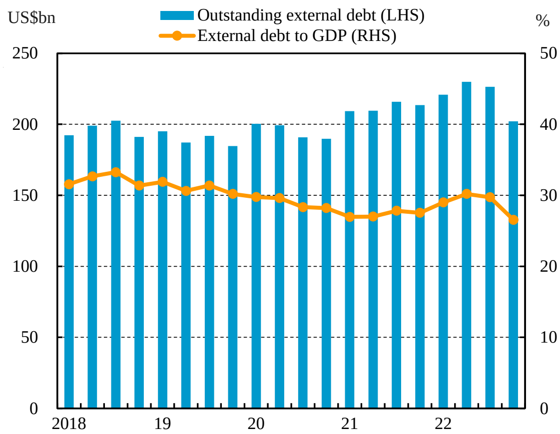
In 2022, owing to a decrease in the merchandise trade surplus caused by a smaller increase in exports than imports, the annual current account surplus contracted to US$101.7 billion (Chart 2.13, left panel), or 13.36% of the year's GDP, a decrease of US$15.4 billion, or 13.16% over the previous year.[22] In terms of the financial account, as banks increased foreign securities investments which boosted foreign assets, along with a decrease in foreign liabilities owing to reduced holdings of Taiwanese stocks by foreign institutional investors, the financial account posted an increase of US$98.1 billion throughout the year (Chart 2.13, right panel). Meanwhile, the Bank's reserve assets increased by US$10.9 billion compared to the previous year.

Chart 2.13 Current account surplus and net asset increase in financial account



Source: CBC.

Chart 2.14 External debt servicing capacity



Notes: 1. Figures for outstanding external debts are on an end-of-period basis.
2. Figures for GDP are on an annualized basis.

Sources: CBC and DGBAS.

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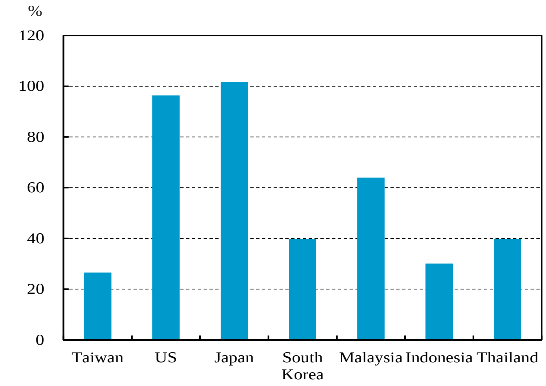
[21] Private credit refers to the loans granted by major financial institutions to various private enterprises, individuals, and non-profit organizations in Taiwan, as well as the purchases of securities such as stocks, corporate bonds, commercial paper, acceptance bills, beneficiary certificates issued by private enterprises, and the equities of long-term investments in private enterprises.

[22] For the ratio of current account deficit to GDP, it is generally deemed that its critical value as a risk measure is 3%. A country in which the reading is greater than 3% and has risen by at least 5 pps from the previous year is considered to be relatively high risk.

FX reserves amounted to US$554.9 billion at the end of 2022, rising by 1.19% from a year earlier, mainly supported by the earnings from portfolio investment operations of FX reserve assets and the adjustment operations by the Bank to maintain an orderly foreign exchange market. At the end of April 2023, the FX reserves continuously increased to US$561.1 billion.

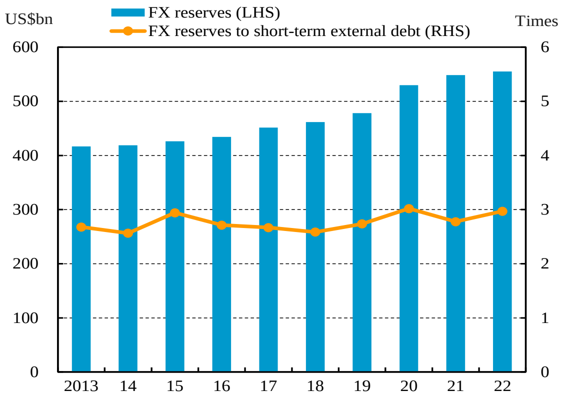
Chart 2.15 External debt to GDP in selected countries



Note: Figures are as of the end of 2022.
Sources: CEIC and DGBAS.

External debt contracted, while debt servicing capacity remained satisfactory

Chart 2.16 Short-term external debt servicing capacity



Source: CBC.

Primarily because of a decrease in the short-term external debt of the domestic banking sector, Taiwan's external debt[23] declined to US$202.1 billion at the end of 2022, decreasing by 5.36% compared to a year earlier (Chart 2.14). The largest share of external debt went for the private sector, registering US$201.1 billion, while the public sector share only reached US$1.0 billion. In addition, Taiwan's external debt to GDP stood at 26.55% at the end of 2022, declining from 27.53% at the end of the previous year. It was lower than those in the US and neighboring Asian countries (Chart 2.15), and far below the internationally recognized alert threshold.[24]

Furthermore, at the end of 2022, the ratio of FX reserves to short-term external debt went up to 2.97 times owing to an increase in FX reserves and a shrinkage in short-term external debt (Chart 2.16), and was still much higher than the internationally recognized alert threshold,[25] implying that Taiwan's FX reserves have a decent capacity to meet short-term external debt obligations.

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23 See Note 3.

24 The general international consensus is that a country with a ratio of external debt to GDP lower than 50% is deemed to be relatively low risk.

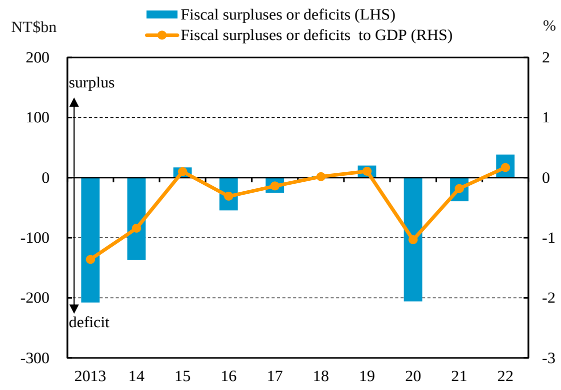
25 The general international consensus is that a country with a ratio of FX reserves to short-term external debt higher than 100% is deemed to be relatively low risk.

Fiscal position registered surpluses and government debt stayed within a manageable level

In 2022, in order to address uncertainties in international political and economic conditions and sustain economic growth momentum, the government actively promoted the Three Major Programs for Investing in Taiwan.[26] However, as a result of a significant increase in profit-seeking enterprise income tax and the budget implementation of the government in conjunction with the principle of austerity, the government fiscal surplus stood at NT$38.4 billion, equivalent to 0.17% of GDP for the year (Chart 2.17), which was better than those of major economies including the US, the euro area, the UK, and Japan (Chart 2.18), and also much higher than internationally recognized minimum levels.[27]

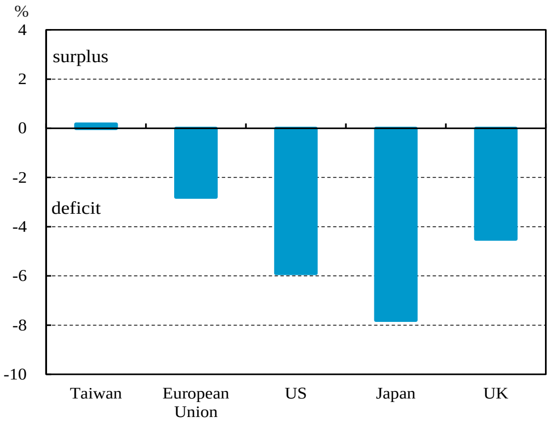
The outstanding public debt at all levels of government[28] rose to NT$6.7 trillion at the end of 2022, increasing by 2.73% year on year. Nevertheless, the ratio of total public debt to the year's GDP continued to drop to 29.69% (Chart 2.19), indicating that government debt stayed within a manageable level.[29]

Chart 2.17 Fiscal surpluses or deficits



Notes: 1. Fiscal position data include those of central and local governments.
2. Figures for 2022 are final accounts for the central government and self-compiled final accounts for local governments.
Sources: MOF and DGBAS.

Chart 2.18 Fiscal surpluses or deficits to GDP in selected countries



Note: Figures are as of the end of 2022.
Sources: IMF and MOF.

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26 The Three Major Programs for Investing in Taiwan include the Action Plan for Welcoming Overseas Taiwanese Businesses to Return to Invest in Taiwan, the Action Plan for Accelerated Investment by Domestic Corporations, and the Action Plan for Accelerated Investment by Small and Medium-sized Enterprises (SMEs). These programs will be implemented from July 1, 2019, to December 31, 2024.

27 See Note 5.

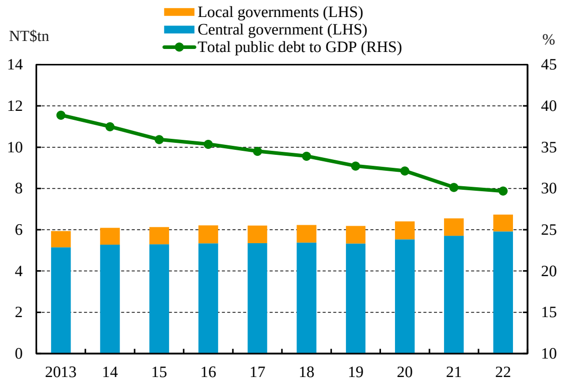
28 The term "outstanding debt at all levels of government" as used in this report refers to outstanding non-self-liquidating debt with a maturity of one year or longer.

29 See Note 6.

2.2.2 Corporate sector

In 2022, the overall revenue of TWSE- and OTC-listed companies reached a new high with favorable profits. Their average financial leverage ratios decreased, and the short-term debt servicing capacity remained sound at the end of 2022. Although the foreign currency liabilities of listed companies contracted to a lower level at the end of September 2022, their exchange rate risks still warrant prudent management. The NPL ratio for corporate loans granted by financial institutions continued to hit a new low at the end of the year, and the credit quality for the corporate sector was satisfactory.

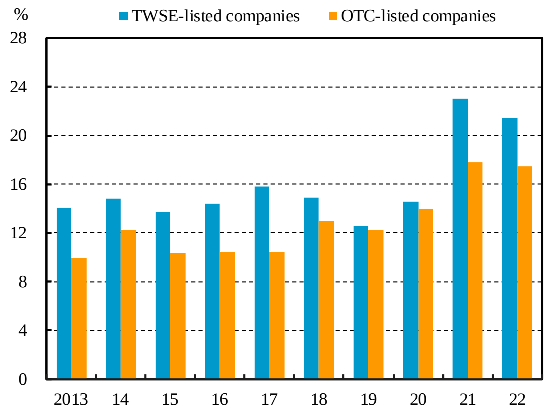
Chart 2.19 Public debt



Notes: 1. Outstanding public debt refers to non-self-liquidating debt with a maturity of one year or longer, excluding external debt.
2. Figures for 2022 are preliminary final accounts for the central government and self-compiled final accounts for local governments.

Sources: MOF and DGBAS.

Chart 2.20 Return on equity in corporate sector



Note: Return on equity = net income before interest and tax/average equity.

Source: TEJ.

Revenue of both TWSE- and OTC-listed companies reached a record high with favorable profitability

The net operating revenue of TWSE- and OTC-listed companies in 2022 reached a historical high of NT$37.85 trillion and NT$2.71 trillion, respectively, benefiting from the continuous developments of emerging technology applications and digital transformation opportunities although global final demand showed signs of weakening. Their average ROEs registered 21.44% and 17.49%, slightly lower than the previous year's figures of 23.01% and 17.78%, respectively (Chart 2.20), but still reached the second-highest level on record. Overall, the profitability remained strong.

The leverage for listed companies decreased, and their short-term debt servicing capacity remained sound

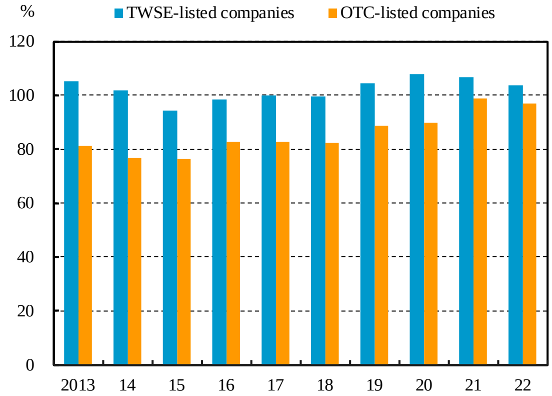
At the end of 2022, the average leverage ratios for both TWSE- and OTC-listed companies decreased from 106.85% and 98.81% at the end of the previous year to 103.65% and 96.79%, respectively (Chart 2.21), benefiting from the sustained profitability. This indicated a slight improvement in the overall financial leverage level of listed companies.

Moreover, the current ratios for TWSE- and OTC-listed companies continued to rise to 163.74% and 189.05% at the end of 2022 from 159.79% and 183.21%, respectively, a year earlier (Chart 2.22). Although the interest coverage ratios dropped to 23.17 times and 24.91 times from 34.58 times and 30.23 times, respectively (Chart 2.23), owing to a greater increase in interest expenses, the overall short-term debt servicing capacity for listed companies remained sound.

Foreign currency liabilities of the corporate sector contracted, but their exchange rate risks still warrant prudent management

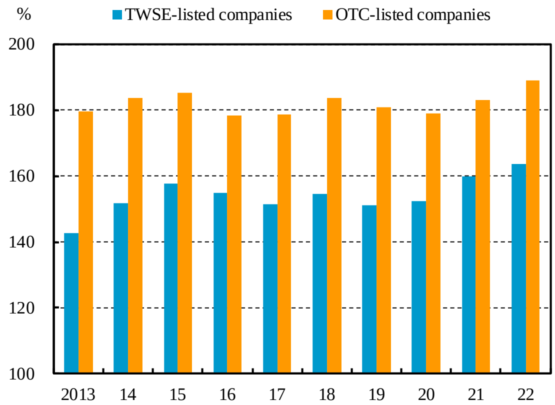
As foreign currency liabilities reduced and equity expanded, the foreign currency liability-to-equity ratios of listed companies decreased from 32.85% and 21.07% at the end of the previous year to 30.78% and 19.10%, respectively, as of end-September 2022 (Chart 2.24). Considering the recent amplified volatility in the international FX market, it is still advisable for listed companies to prudently manage exchange rate risks.

Chart 2.21 Leverage ratios in corporate sector



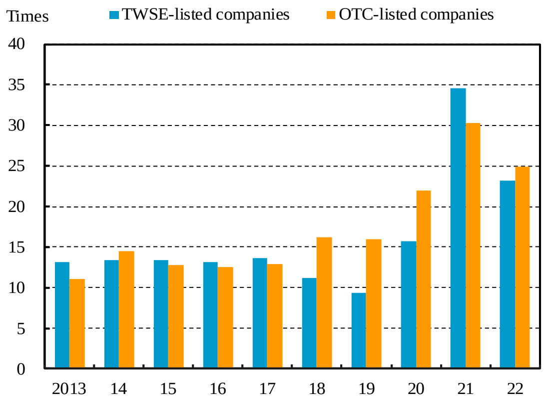
Note: Leverage ratio = total liabilities/total equity.
Source: TEJ.

Chart 2.22 Current ratios in corporate sector



Note: Current ratio = current assets/current liabilities.
Source: TEJ.

Chart 2.23 Interest coverage ratios in corporate sector



Note: Interest coverage ratio = income before interest and tax/interest expenses.
Source: TEJ.

Credit quality remained satisfactory as the NPL ratio of the corporate sector continued to reach a new low

The NPL ratio for corporate loans[30] from financial institutions dropped to a new low of 0.21% at the end of 2022 from 0.23% a year earlier (Chart 2.25). This showed that the overall credit quality for the corporate sector was satisfactory.

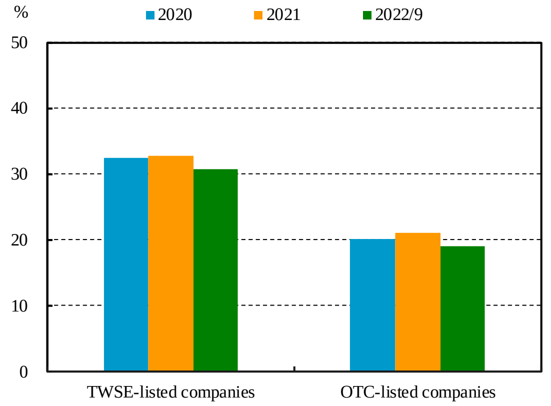
2.2.3 Household sector

Household borrowing expanded at a slower pace and household indebtedness slightly decreased in 2022, while the short-term household debt servicing pressure tightened marginally. However, the household sector held enormous net worth, reflecting that the debt servicing capacity of households remained sound. Moreover, the credit quality of household borrowing from financial institutions appeared to be satisfactory. Nevertheless, considering the rise in interest rates on bank loans and the fall in real regular earnings for employees owing to inflation, the debt servicing capacity of some households with higher debt burdens warrants close attention.

Growth of household borrowing slowed

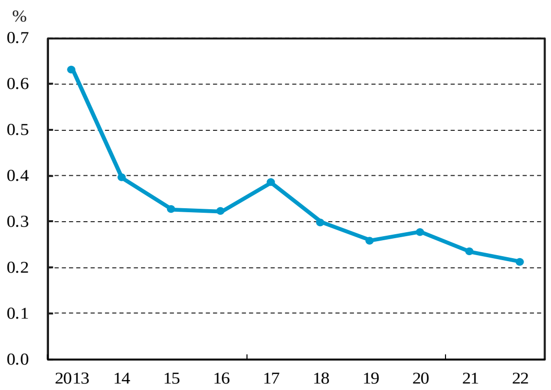
Household borrowing reached NT$19.98 trillion at the end of 2022, equivalent to 88.15% of annual GDP for the year (Chart 2.26), higher

Chart 2.24 Foreign currency liability-to-equity ratios in corporate sector



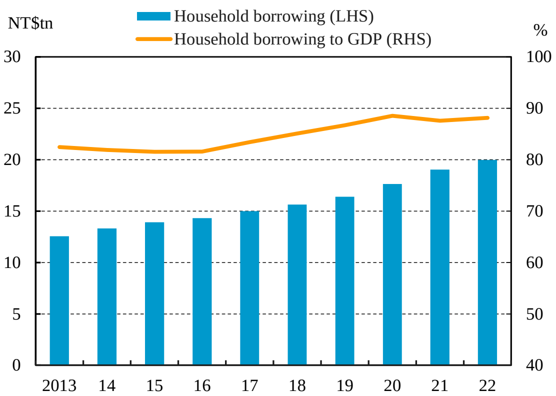
Note: Data on foreign currency liabilities in the corporate sector has been disseminated from 2020 onwards.
Source: TEJ.

Chart 2.25 NPL ratio of corporate loans



Source: JCIC.

Chart 2.26 Household borrowing to GDP



Sources: CBC, JCIC, and DGBAS.

[30] The data for the corporate sector herein are on the basis of listed and unlisted corporations provided by the Joint Credit Information Center (JCIC), excluding the data of overseas branches of domestic banks.

than the 87.57% of the previous year. The main purpose of household borrowing was to purchase real estate, accounting for 63.16%, followed by current operation loans,[31] accounting for 34.62%, and the rest of the household borrowing took small proportions (Chart 2.27).

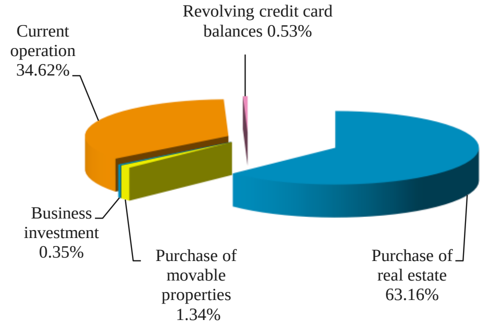
The annual growth rate of household borrowing rose at a slower pace of 4.95% in 2022, down from 7.99% in the previous year, mainly attributable to the purposes of real estate purchase and working capital needs. Compared to other countries, the growth rate of household borrowing in Taiwan was lower than those in the US and Australia, but higher than those in South Korea and Japan. As for household borrowing to GDP, Taiwan's ratio was lower than those in Australia and South Korea, but higher than those in the US and Japan (Chart 2.28).

Household indebtedness decreased slightly and net worth was high

The ratio of household borrowing to total disposable income[32] slightly dropped to 1.51 in 2022, reflecting a slightly eased household debt burden. However, with the rise in interest rates on bank loans, the debt servicing ratio ascended marginally to 48.87% (Chart 2.29), indicating that short-term household debt servicing pressure tightened marginally.

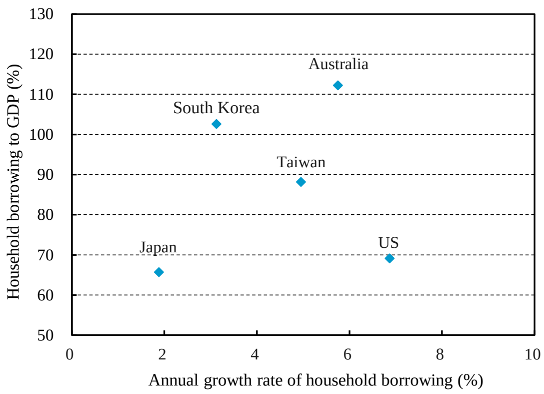
Furthermore, household net worth[33] in Taiwan

Chart 2.27 Household borrowing by purpose



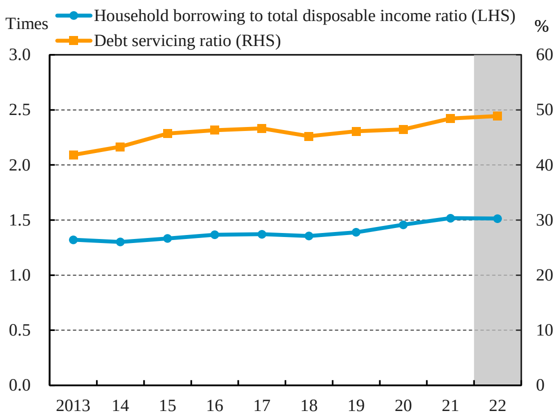
Note: Figures are as of the end of 2022.
Sources: CBC and JCIC.

Chart 2.28 Household indebtedness in selected countries



Note: Figures are as of the end of 2022.
Sources: Fed, BOJ, BOK, ABS, IMF, DGBAS, JCIC, and CBC.

Chart 2.29 Household indebtedness and debt servicing ratio



Note: Total disposable income in shaded area is a CBC estimate.
Sources: CBC, JCIC, and DGBAS.

31 The term "current operation loans" includes outstanding cash card loans.
32 Total disposable income = disposable income + rental expenses + interest expenses.
33 See Note 7.

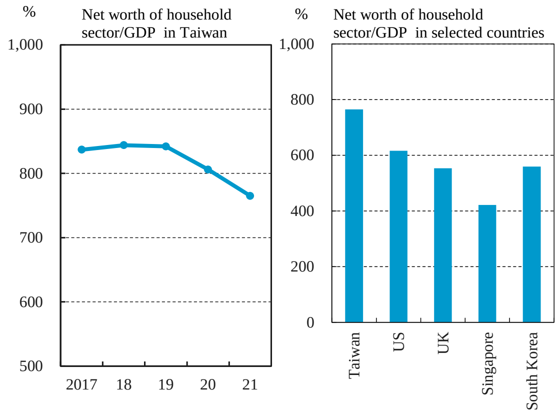
has been remarkable over the past decades and has held at more than 7 times the GDP in recent years. Compared to other countries, the household net worth to GDP ratio in Taiwan was far higher than those in the US, the UK, Singapore and South Korea (Chart 2.30), showing that the financial condition of households in Taiwan was sound.

The NPL ratios of household borrowing fell to a new low, reflecting satisfactory credit quality

As the impact of COVID-19 on the household sector shrank noticeably, the NPL ratio of household borrowing fell to a new low of 0.12% at the end of 2022. Among the categories, the NPL ratio of loans for purchase of real estate declined to a historical low of 0.08% (Chart 2.31), reflecting satisfactory credit quality.

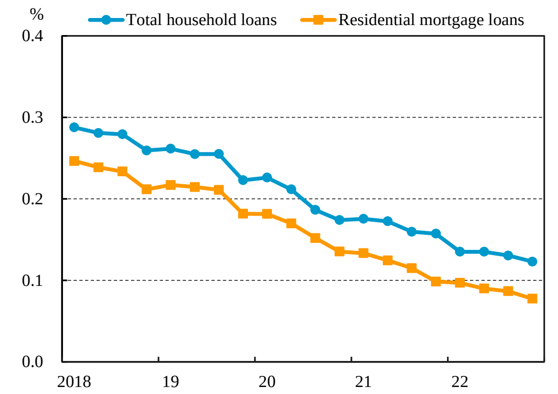
Although the minimum wage rose in recent years, real monthly regular earnings for employees in 2022 decreased slightly by 0.15% year on year owing to inflation. This, coupled with rising interest rates on bank loans, indicated that the debt servicing capacity of some households with higher debt burdens warrants close attention.

Chart 2.30 Household net worth to GDP



Notes: 1. The household sector herein includes households and non-profit organizations.
2. In the right panel, figures are as of the end of 2021.
Sources: DGBAS and official websites of selected countries.

Chart 2.31 NPL ratios of household borrowing



Source: JCIC.

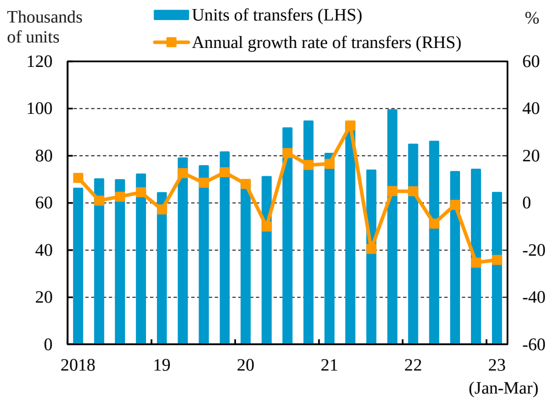
2.2.4 Real estate market

Transactions in the housing market cooled down remarkably as the uptrend in house prices decelerated and even showed signs of decline in some areas in the second half of 2022. The mortgage burden slightly decreased but still remained at a high level. The pressure from an overhang of unsold new residential houses is gradually increasing. As the Bank's tightening of monetary policy since March 2022 and continuous implemention of targeted macroprudential measures, coupled with relevant measures adopted by ministries and government agencies to curb speculation in the housing market, achieved positive effects, the growth of construction loans and new housing loans extended by banks continued to slow down, and related credit risk management stayed satisfactory.

Transactions in the real estate market cooled down remarkably

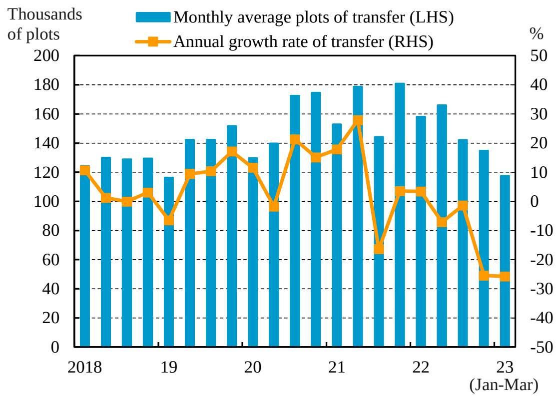
Domestic housing transactions thrived in 2022 Q1. However, from Q2 onwards, as banks gradually raised the interest rates on real estate loans and the government continued to implement measures ensuring the soundness of the housing market, a wait-and-see sentiment to the demand for real estate emerged. These, coupled with a higher base period in the previous year, resulted in the annual growth rate of the total number of building ownership transfers turning negative and dropping to -25.32% in Q4. As a result, the total number of building ownership transfers decreased by 8.64% year on year from 348 thousand to 318 thousand units in 2022 (Chart 2.32). Entering 2023, owing to the wait-and-see atmosphere in the housing market, the total number of building ownership transfers declined to 64 thousand units in Q1, a record low since 2019 Q2 (Chart 2.32).

Chart 2.32 Number and growth of building transfers



Source: *Monthly Bulletin of Interior Statistics*, MOI.

Chart 2.33 Land transfers for transaction and annual growth rate



Source: *Monthly Bulletin of Interior Statistics*, MOI.

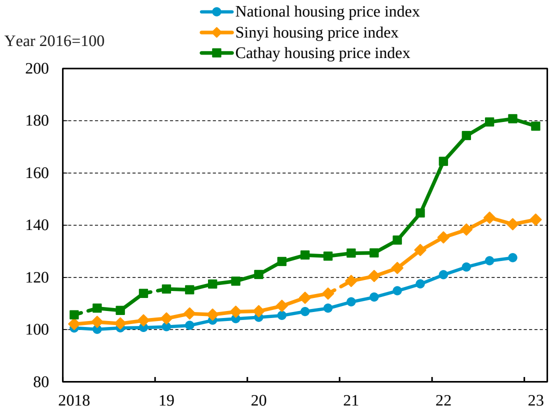
In terms of loans for land transactions extended since January 2022, the Bank stipulated that, in principle, the construction shall commence within 18 months. From then on, the real estate industry became more conservative in their purchase of vacant land. Coupled with the lessening land demand from manufacturers seeking to expand their factories, the total number of land ownership transfers fell by 8.45% compared to the previous year (Chart 2.33). From early 2023 onwards, as the real estate industry's prudent outlook of the housing market continued, the total number of land ownership transfers decreased by over 20% for two consecutive quarters, registering a drop of -25.74% in Q1 (Chart 2.33).

Real estate prices decelerated, showing signs of decline in some areas

The national housing price index released by the MOI continued to rise gradually in 2022 and reached a new high of 127.51 in Q4 (Chart 2.34). However, the annual growth rate in Q4 fell to 8.52%, moderating for two consecutive quarters.

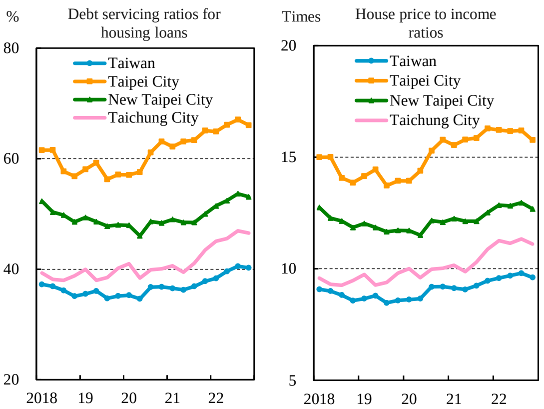
The Cathay housing price index (for newly built houses) elevated sharply in 2022, and hit a historical high of 180.74 in Q4, with double-digital growth for five consecutive quarters. Afterwards, influenced by hesitation among real estate buyers, the index dropped to 177.91 in 2023 Q1, while the annual growth rate shrank to 8.20%. The Sinyi housing price index (for existing houses) kept its upward trend in the first three quarters of 2022 and has slightly fluctuated at high levels since Q4. However, the index registered 142.12 in 2023 Q1 with the annual growth rate dwindling to 5.03%, indicating contractions for two successive quarters (Chart 2.34).

Chart 2.34 House price indices



Note: For comparison purposes, all three indices use the same base year of 2016 (2016 average = 100).
Sources: MOI, Cathay Real Estate, and Sinyi Real Estate Inc.

Chart 2.35 Debt servicing ratios for housing loans and house price to income ratios



Notes: 1. Debt servicing ratio for housing loans = median monthly housing loan payment/median monthly household disposable income.
2. House price to income ratio = median house price/median annual household disposable income.
Source: *Statistic on Housing Affordability*, MOI.

Mortgage burden went down mildly after reaching a peak

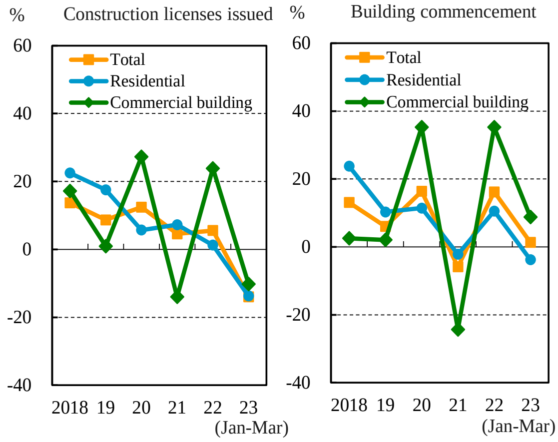
The debt servicing ratio for housing loans rose gradually quarter by quarter since 2022 Q1 and reached a peak of 40.55% in Q3, but mildly went down to 40.25% in Q4. Among the cities in Taiwan, Taipei City showed the heaviest mortgage burden with its ratio registering 66.06% (Chart 2.35, left panel). Similarly, Taiwan's house price to income ratio grew quarter by quarter and reached a peak of 9.80 times in 2022 Q3, then declined to 9.61 times in Q4 (Chart 2.35, right panel).

Construction licenses issued and building commencement soared, while pressure from the overhang of unsold newly built residential houses went up gradually

With an abundance of new residential housing projects open for pre-sale, the total floor space of construction licenses issued increased by 5.53% year on year in 2022. Meanwhile, the total floor space of construction commencement went up by 16.20%, mainly because part of residential building commencements of the previous year had been postponed to 2022, and the Bank required borrowers to start construction within 18 months after their land loans were approved. Along with construction companies being cautious about launching new projects in 2023 Q1, the total floor space of construction licenses issued reduced by 13.96% year on year, while the total floor space of construction commencement kept growing by 1.34% year on year (Chart 2.36).

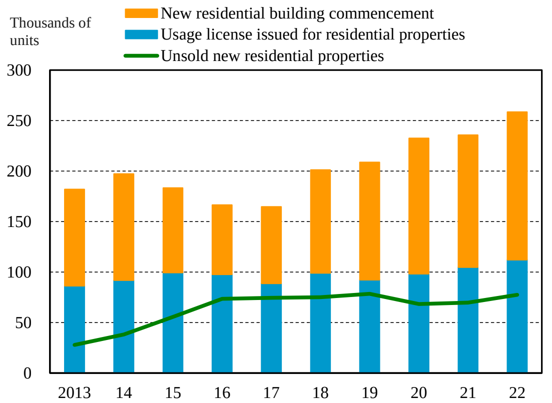
Additionally, the total floor space of usage licenses issued increased by 2.47% year on year in 2022, resulting from successive completion and release of residential housing projects. The aforementioned total floor space increased by 9.64% in 2023 Q1, mainly because those industrial and commercial buildings had surged by 72.37%.

Chart 2.36 Annual growth rates of floor space of construction licenses issued and construction commencement



Note: Commercial building includes buildings for commerce, industry, storage, business and service.
Source: *Monthly Bulletin of Interior Statistics*, MOI.

Chart 2.37 New residential buildings and unsold properties



Notes: 1. The MOI uses data from land registration, Taiwan Power Company, and house tax registration to classify residences that have been registered for the first time within the last 5 years and have an average electricity consumption of less than 60 kWh as unsold new residential properties.
2. Figures are yearly data, except for figure for 2022 of unsold new residential properties, which is as of the end of 2022 Q2.

Source: Real Estate Information Platform, MOI.

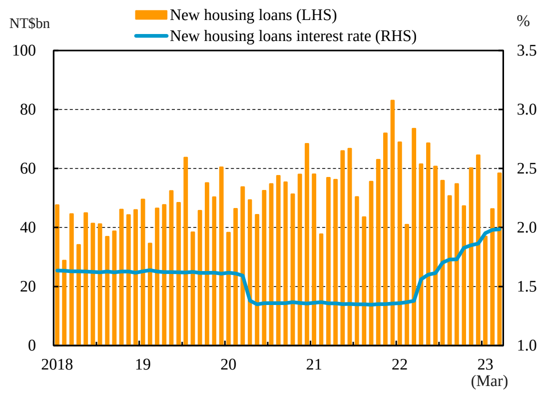
According to statistics from the MOI, the number of construction projects commenced for new residential buildings set a record high of 146.4 thousand units in 2022 (Chart 2.37), and then kept growing at an annual rate of 7.03% to reach 35.8 thousand units in 2023 Q1. With the enormous supply, high prices, and low sales of new residential buildings, the pressure to sell unsold newly built residential houses went up gradually.

Real estate loans grew at a slower pace and mortgage interest rates rose

The transaction volume of the housing market shrank in 2022. However, because of the upward movement of housing prices and the considerable amount of bank loans issued in cooperation with construction companies for housing ownership transfers, the average monthly amount for new housing loans granted by the dominant five banks was about NT$58.9 billion, only contracting by 0.23% over the previous year. The aforementioned average amount for 2023 Q1 declined to NT$47.2 billion (Chart 2.38), with an expanding year-on-year decrease of 22.75%.

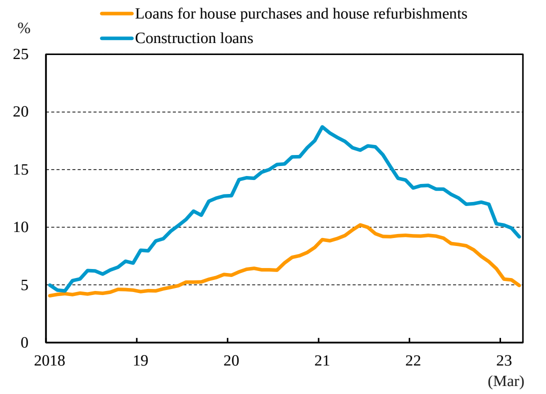
Regarding the interest rate of real estate loans, as the Bank urged banks to fulfill the risk pricing principle and had raised its policy rates five times from March 2022, the average interest rate for new housing loans granted by the dominant five banks rose month by month from early 2022 onwards, and elevated to 1.985% in March 2023 (Chart 2.38). Nevertheless, the degree of increase was still limited compared to other major economies.

Chart 2.38 New housing loans – amount and interest rate



Source: CBC.

Chart 2.39 Annual growth rates of real estate loans



Source: CBC.

As the transactions of buildings and land became less active in 2022, the annual growth rate of outstanding construction loans granted by banks[34] plunged dramatically to 9.17% at the end of March 2023. Meanwhile, the annual growth rate of outstanding loans for house purchases and refurbishments also dropped to 4.96% (Chart 2.39). The aggregate amount of the aforementioned real estate loans accounted for 36.84% of total loans at the end of March 2023, which remained roughly unchanged compared to the end of 2022, yet lower than the peak at the end of 2021 (Chart 2.40).

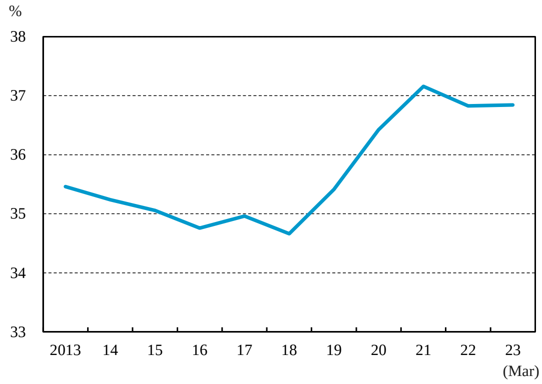
[34] Refers to domestic banks and the local branches of foreign and China's banks.

Banks' risk management on real estate loans remained satisfactory

The weighted average loan-to-value (LTV) ratio for new housing loans decreased marginally and the annual average registered 72.41% in 2022. The average LTV ratio for the regulated loans newly granted by banks dropped significantly, while regulated housing loans extended to corporations registered the lowest level among the loan types, with a ratio of 35.93% in March 2023.

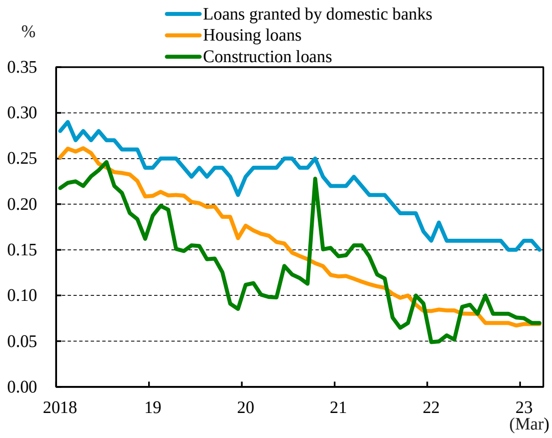
Furthermore, the NPL ratios of housing loans and construction loans granted by domestic banks both dropped to 0.07% at the end of March 2023, lower than the 0.15% NPL ratio of total loans (Chart 2.41). In addition, most of the 36 domestic banks passed the latest stress tests requested by the FSC. All of these revealed that the risk management of domestic banks on real estate loans remained satisfactory.

Chart 2.40 Real estate loans to total loans



Notes: 1. Real estate loans refer to the aggregate amount of loans for house purchases, house refurbishments, and construction loans.
2. Figures are end-of-year data, except for figure of 2023, which is end-March data.
Source: CBC.

Chart 2.41 NPL ratios of housing loans and construction loans



Note: NPLs herein exclude non-accrual loans.
Source: CBC.

The Bank and the relevant ministries and agencies persistently endeavored to implement the Healthy Real Estate Market Plan to foster a sound real estate market

To implement the Healthy Real Estate Market Plan initiated by the government for effective allocation and rational application of credit, the Bank has adjusted its targeted macroprudential measures four times since December 2020. Additionally, the Bank continued to cooperate with the FSC to strengthen the risk management of real estate lending or guarantee business of banks and bills finance companies for the purpose of promoting financial stability. The Bank and the FSC also launched a targeted examination toward mortgage loans. Besides this, the FSC imposed fines on banks that failed to establish and implement anti-money laundering practices on housing loans to natural persons which involved groups of speculators. Moreover, the FSC raised risk weights on mortgage loans of banks in February 2022[35] to enhance their risk management.

In addition, the MOI, the Fair Trade Commission, the Consumer Protection Committee, and local governments have consecutively carried out joint audits targeting pre-sold houses and amended *The Equalization of Land Rights Act* in February 2023 to refine the property market mechanism. The Ministry of Finance (MOF) also amended regulations to prevent short-term speculation and tax evasion. All of the abovementioned efforts contributed to fostering a sound real estate market. Notwithstanding, with part of the authority and responsibility of real estate market management resting with local governments, a consummate system relies on cooperation between central and local governments to execute and improve relevant measures constantly to achieve the goals of sound development of the real estate market and fulfill housing justice.

2.3 General assessment of international and domestic macro environments

As for international economic and financial conditions, major central banks accelerated interest rate hikes to curb surging inflation in 2022, resulting in spillover effects that tightened global financial conditions and spurred a slowdown in global economic growth. Looking ahead to 2023, with a tighter financial environment and still-elevated geopolitical risks, global economic growth is likely to continue its downward path, while inflation pressures may ease but still remain high. In addition, the turbulence in global financial markets stemming from rapid interest rate hikes by major central banks, subsequent developments of the banking turmoil in the US and Europe, and the intensifying impact of climate change on the financial sector all exacerbate global financial vulnerabilities.

Regarding the domestic macro environment, Taiwan's economic growth remained stable in 2022. Although domestic prices were high, inflation was relatively moderate compared to other countries. Moreover, external debt servicing capacity stayed robust with ample FX reserves. Fiscal surpluses and outstanding public debt within a manageable level were conducive to weathering uncertainties surrounding international political and economic conditions, as well as maintaining economic growth momentum. With regard to the corporate sector, the overall revenue of TWSE- and OTC-listed companies reached a new high with favorable profits, coupled with a sustained short-term debt servicing capacity. However, their exchange rate risks still warrant prudent management. When it comes to the household sector, despite the fact that

35 Applies to loan cases that were new, renewed or transferred since February 18, 2022.

the short-term debt burden trended upwards marginally, household financial health was steady, underpinned by their enormous net worth. Nonetheless, in view of rising interest rates on bank loans and decreasing real monthly regular earnings for employees, the debt servicing capacity of some households with higher debt burdens warrants close attention. Lastly, transactions in the real estate market cooled down remarkably, with moderately increasing house prices. Additionally, rising interest rates for bank loans and higher commodity prices could lead to some small and medium-sized construction firms with poor financial conditions facing greater challenges. Accordingly, the impact of real estate market trends on banks' credit quality should be closely observed.

In sum, in a scenario of major central banks tightening monetary policies and geopolitical risks remaining high, the trends of rising global interest rates, heightened volatility in financial markets, and gloomy global economic prospects could affect Taiwan's corporate sector outlook, household debt servicing capacity, and real estate market performance. This, in turn, could add risks to the financial sector, which warrants close attention.

III. Financial system assessment

3.1 Financial markets

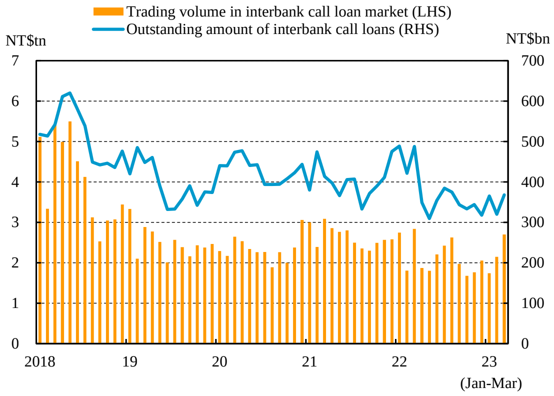
In 2022, the outstanding amount and trading volume in interbank call loans both declined, while the markets remained stable. The outstanding amount of bill issuance slightly edged down mainly because of the reduction in the issuance of treasury bills. However, the bill trading volume in the secondary market continued to expand, with CP constituting the largest share, which facilitated short-term financing for businesses. Meanwhile, the outstanding amount of bond issuance kept growing, with international bonds increasing the most, but the trading volume decreased mildly owing to reduced positions of major traders. Moreover, in 2022, domestic stock indices rebounded from previous slumps and gradually stabilized. The NT dollar appreciated after depreciating against the US dollar, but with low volatility. Overall, domestic financial markets have remained stable since 2022; however, international circumstances such as global interest rate hikes, future developments of the US banking turmoil, and geopolitical factors could impact Taiwan's financial market and their developments and implications warrant close attention.

3.1.1 Money and bond markets

Both outstanding amount and trading volume of interbank call loans declined

In 2022, the average daily outstanding amount of interbank call loans registered NT$375.7 billion and dropped by 6.58% year on year, mainly owing to a decrease in interbank lending. Given the fact that financial institutions became more conservative in fund allocation and the lengthening of interbank lending periods led to a lower incidence of rolling over such loans, the trading volume of interbank call loans decreased by 18.60% year on year in 2022. In 2023 Q1, the average daily outstanding

Chart 3.1 Interbank call loan market



Note: Outstanding amount is the monthly average of daily data.
Source: CBC.

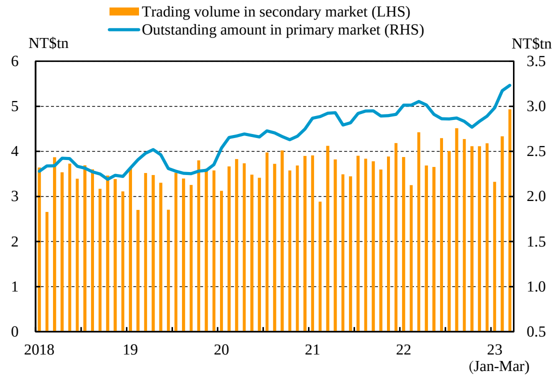
amount and trading volume of interbank call loans both decreased year on year (Chart 3.1).

Outstanding amount of bill issuance edged down, while the bill trading volume in the secondary market continued to increase

The outstanding amount of bill issuance in the primary market registered NT$2.89 trillion at the end of 2022 and dropped by 0.69% year on year, which was mostly attributed to the reduction in the issuance of treasury bills due to ample tax revenue. In 2023 Q1, the outstanding amount of bill issuance began to climb again as the issuance of treasury bills and CP increased (Chart 3.2).

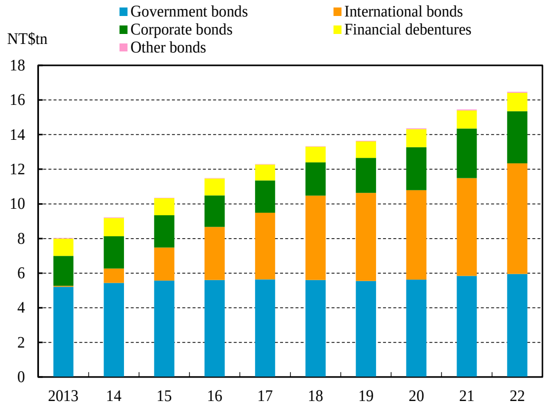
Although the outstanding amount of bill issuance edged down in 2022, the trading volume in the secondary market increased by 7.86% year on year to NT$48.40 trillion thanks to factors such as strong demand for CP investment by corporates. Among them, CP constituted the largest share of 96.81%, slightly expanding from a year earlier. In 2023 Q1, the bill trading volume continued its upward trend over the same period of the previous year (Chart 3.2).

Chart 3.2 Primary and secondary bill markets



Source: CBC.

Chart 3.3 Bonds outstanding in the primary market



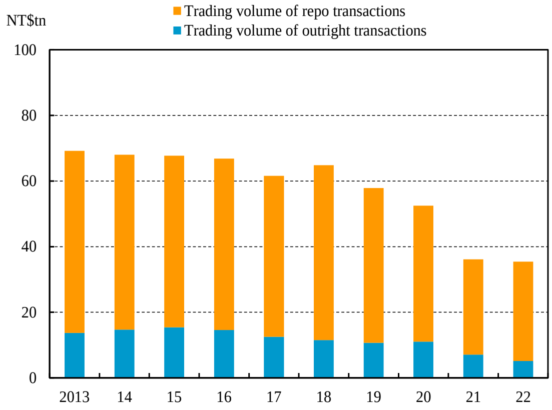
Note: Other bonds include beneficiary securities and foreign bonds.
Source: FSC.

Bond issuance continued to expand, while the trading volume decreased marginally, and the turnover rate of outright bond transactions continued to drop to a record low

The outstanding amount of bond issuance reached a new high of NT$16.48 trillion at the end of 2022 and increased by 6.63% over the end of the previous year, mainly attributed to the 13.14% increase of international bond issuance as foreign institutions issued bonds ahead of schedule or reduced early redemption owing to the expectation of the Fed's rates hike. At the end of 2022, the outstanding amount of corporate bonds and government bonds issuance increased by NT$0.14 trillion and NT$0.11 trillion, respectively, compared to the end of the previous year (Chart 3.3).

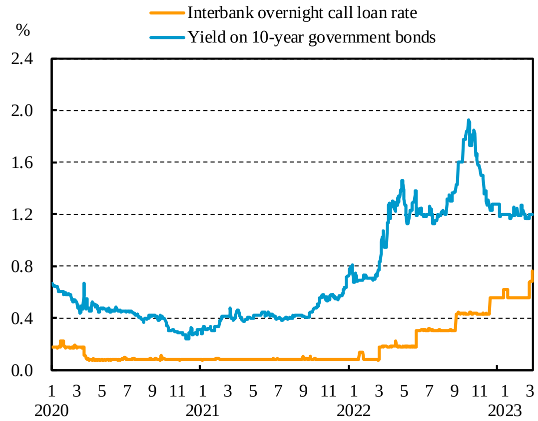
On the other hand, the trading volume in the secondary bond market registered NT$35.40 trillion in 2022, slightly decreasing by 2.03% year on year (Chart 3.4). This was mainly owing to the fact that major bond market traders such as bills finance companies and securities firms reduced their bond holdings after considering the increasing risks of rising bond yields and a narrowing yield spread between their long-term bonds and short-term reverse repos. By trading type, outright transaction volume significantly shrank by 27.72%, while repo transaction volume increased by 4.26% year on year. Nevertheless, the overall trading volume remained at a relatively low level in recent years. As a result, the average monthly outright turnover rate of major bonds decreased continually in 2022 to a recent low of 1.65% and declined further to a record low of 1.55% in 2023 Q1.

Chart 3.4 Outright and repo transactions in the bond market



Source: CBC.

Chart 3.5 Interbank overnight rate and 10-year government bond yield



Source: Bloomberg.

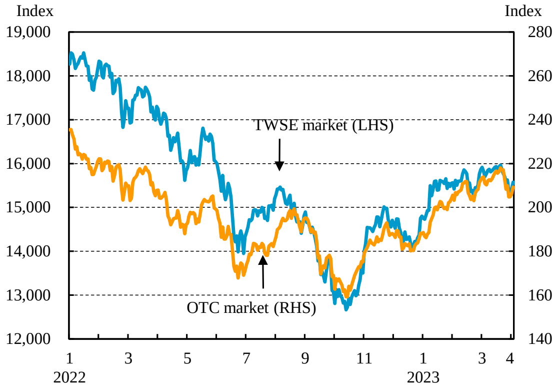
Short-term market rates increased gradually, while long-term market rates surged to a new 14-year high before trending downwards

In terms of short-term market rates, the interbank overnight call loan rate trended upwards after the Bank raised the policy interest rates and the interest rate on the Bank's certificates of deposit (CDs) four times in 2022 (Chart 3.5). Still, liquidity in financial markets remained ample.

As for long-term market rates, influenced by sharp rises in US government bond yields following the Fed's rate hikes, domestic 10-year government bond yields fluctuated and trended upwards during the first three quarters of 2022 and hit a new 14-year high of 1.93% on October 24, 2022 (Chart 3.5). Afterwards, following the decline in US bond yields, domestic

10-year government bond yields also descended gradually but still stood higher than the yields at the end of 2021 (Chart 3.5). Considering that the upward pressure on bond yields globally still exists while inflation in major economies persists and many uncertainties surrounding the future inflation outlook remain, domestic 10-year government bond yields are likely to increase again. The interest rate risk related to bond investments of domestic financial institutions is still high and warrants close attention.

Chart 3.6 Taiwan's stock market indices



Sources: TWSE and TPEx.

3.1.2 Equity markets

Stock indices rebounded after falling from record highs and were not significantly affected by the turmoil in the US and European banking sectors

In 2022, owing to the compound impacts of both negative and positive developments, such as the prolonged pandemic, the outbreak of the Russia-Ukraine war, the Fed's accelerated interest rate hikes, and the measures taken by the FSC to stabilize the domestic stock market, the TAIEX (index of the TWSE market) rebounded to 14,138 at year end after trending down from the historical high of 18,526 at the beginning of the year (Chart 3.6), posting a decrease of 22.40% year on year. Major indices in international stock markets fell sharply in the same period. The TPEX of the OTC market closely tracked the movements of the TAIEX, dropping to 180 at the end of 2022, showing a yearly decrease of 24.08%.

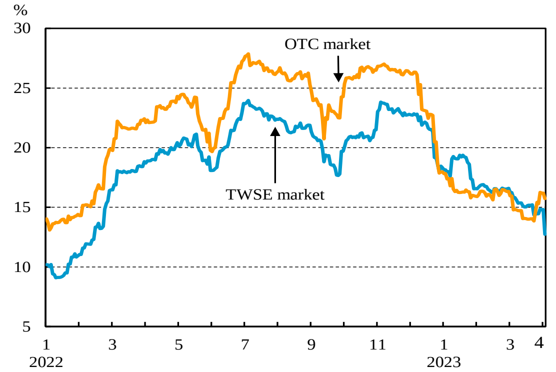
Entering 2023, benefitting from loosened domestic COVID-19 prevention measures and border control, economic activity gradually returned to normal and consumer confidence stabilized. In addition, Taiwan's stock markets were only modestly affected by the recent turmoil in the US and European banking sectors. As a result, the TAIEX fluctuated with an uptrend in the first four months of the year, and the TPEX also followed the same trend (Chart 3.6).

Volatility in the stock markets increased, while annual turnover rates declined

In 2022, rising uncertainty surrounding the international political and economic situation riled global stock markets and, in turn, increased volatility in Taiwan's stock markets. Thanks to the support from the National Financial Stabilization Fund in July, volatility in the TWSE and the OTC markets gradually dropped to 21.33% and 22.71%, respectively, at the end of the year and declined further as of the end of April 2023 (Chart 3.7).

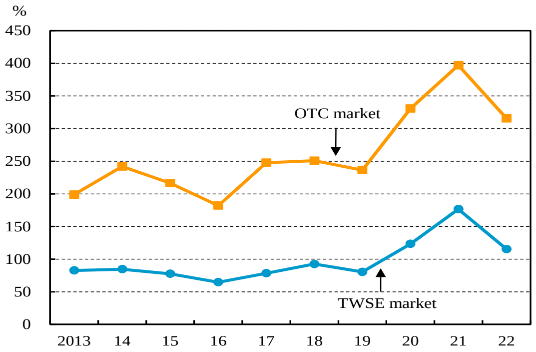
Owing to the notably declining trading volume of Taiwan's stock markets, the monthly average trading value in both the TWSE and the OTC markets significantly dropped by 39.23% and 26.62% year on year to NT$4.67 trillion and NT$1.24 trillion in 2022, respectively. Among market participants, domestic individual investors accounted for 58.30% of the total, lower than the previous year's 69.77%. Affected by the above factors, the annual turnover rates in terms of trading value fell sharply to 115.44% and 315.73% in the TWSE and the OTC markets (Chart 3.8), respectively. This was still higher than in most major international stock markets and only lower than in the US, South Korea, and China (Chart 3.9), indicating that trading in Taiwan's stock markets was still quite active and liquidity remained ample.

Chart 3.7 Stock price volatility in Taiwan's markets



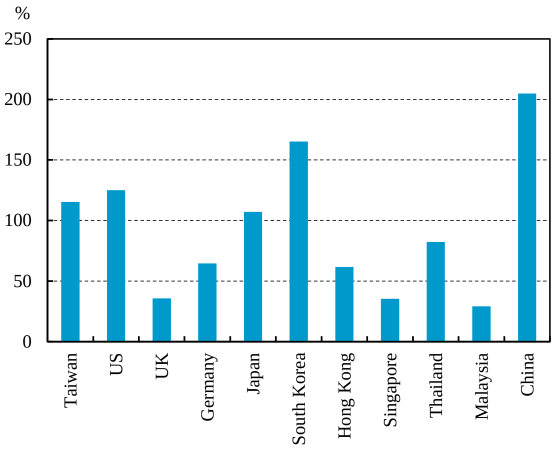
Note: Volatility refers to the annualized standard deviation of 60-day daily index returns.
Sources: TWSE, TPEx, and CBC.

Chart 3.8 Annual turnover rates in Taiwan's stock markets



Sources: TWSE and TPEx.

Chart 3.9 Turnover rates in major stock markets



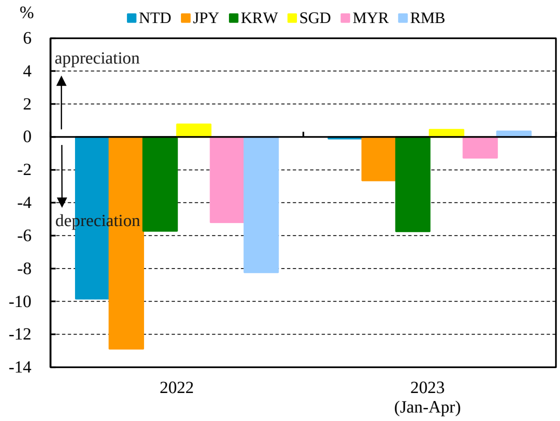
Note: Figures refer to accumulated turnover rates in 2022.
Source: TWSE.

Overall, domestic stock markets were supported by sound economic fundamentals. However, factors including increased uncertainties over the economic prospects and inflation trends in major economies and lingering fear among investors over the repercussions of the banking turmoil in the US and Europe may continue to affect the global economy and international stock markets and, in turn, impact the domestic stock markets. It is necessary to pay close attention to these developments.

Chart 3.10 NTD/USD exchange rate

Source: CBC.

Chart 3.11 Exchange rate changes of major Asian currencies against the US dollar



Note: Changes in 2022 are figures at the end of the year compared to those at the end of 2021; changes in the period of Jan-Apr 2023 are figures at the end of April 2023 compared to those at the end of 2022.
Source: CBC.

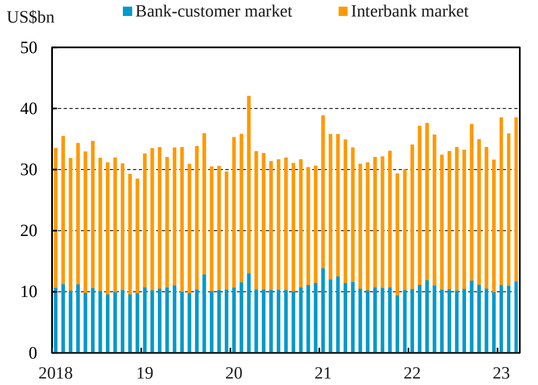
3.1.3 FX market

The NT dollar turned to appreciate after depreciating against the US dollar, while the trading volume of the FX market increased

In 2022, in view of high and persistent inflation, the Fed implemented an aggressive series of interest rate hikes, resulting in a strong US dollar. This, coupled with continued outflows driven by a reduction of investments by foreign institutional investors in Taiwan's stock markets, led to NT dollar depreciation against the US dollar towards a level below 32 in October. Subsequently, as the US headline and core inflation rates both showed signs of easing, along with the expectation of the Fed slowing its pace of rate hikes, the NT dollar exchange rate rebounded to 30.708 against the US dollar at the end of 2022, depreciating by 9.83% from the end of the previous year. Then, at the beginning of 2023, as an easing in US inflation reinforced market expectation of slower Fed rate hikes, the NT dollar uptrend thus continued before reversing a while later to end April at 30.740 (Chart 3.10), depreciating by 0.10% compared to the end of 2022.

In 2022, most major Asian currencies depreciated against a strong US dollar. However, as the US dollar weakened between January and April 2023, the downward pressure on most major Asian currencies eased, with the SGD and RMB even appreciating against the US dollar. In the meantime, the NT dollar depreciated relatively slightly against the US dollar; most of the other major Asian currencies continued to depreciate against the US dollar, albeit to a smaller degree than earlier (Chart 3.11).

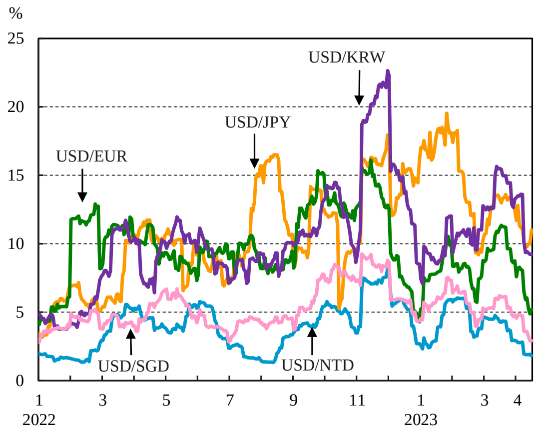
Chart 3.12 FX market trading volume



Notes: 1. Trading volume is the monthly average of daily data.
2. The latest data for trading volume are as of March 2023.
Source: CBC.

Trading in Taiwan's FX market expanded in 2022 and the average daily trading volume amounted to US$34.5 billion, rising by 4.40% from US$33.0 billion a year earlier primarily because of an increase in interbank transactions (Chart 3.12). The daily trading volume in March 2023 amounted to US$38.5 billion, higher than the US$37.6 billion registered in the same period of the previous year.

Chart 3.13 Exchange rate volatility of various currencies versus the US dollar



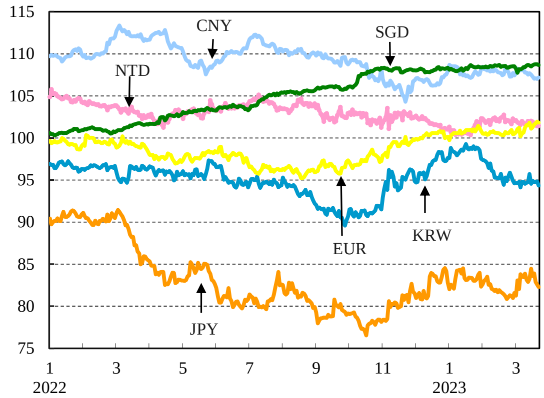
Note: Volatility refers to the annualized standard deviation of 20-day daily returns.
Source: CBC.

NT dollar exchange rate volatility remained relatively stable

The volatility of the NT dollar exchange rate against the US dollar fluctuated between 1.33% and 8.18% in 2022 and registered an annual average of 3.89%, which was relatively lower than those of other major currencies. From January to April 2023, the volatility of the NT dollar exchange rate declined and registered between 1.81% and 6.04%. Compared to major currencies such as the Japanese yen, the euro, the Singapore dollar, and the Korean won, the NT dollar exchange rate remained relatively steady against the US dollar (Chart 3.13).

The nominal and real effective exchange rate indices of the NT dollar fluctuated within a narrow range, indicating the dynamic stability of the NT dollar

Chart 3.14 NT dollar nominal effective exchange rate index



Source: BIS.

In 2022, the NEER of the NT dollar weakened with narrow fluctuations throughout the year and registered 100.88 at year end, a decrease of 3.43% compared to 104.46 at the end of 2021. The main reasons were poor export growth in the second half of the year owing to a slowdown in the global economy, and continued capital outflows driven by a reduction of investments by foreign institutional investors in Taiwan's stock markets. However, the NEER of the NT dollar rebounded to 101.47 at the end of March 2023, a slight increase of 0.58% compared to the end of the previous year (Chart 3.14). During the same period, the real effective exchange rate (REER) index of the NT dollar also fluctuated within a limited range and stood at 99.16 in December 2022, dropping by 4.58% compared to 103.92 registered in December 2021. In March 2023, the NT dollar's REER continued to decline to 98.62, a slight decrease of 0.54% compared to December 2022. The volatility of the NT dollar's REER remained relatively stable compared to other major Asian currencies.

3.2 Financial institutions

In 2022, the performance of Taiwan's financial institutions varied greatly. Domestic banks registered high profitability thanks to widening spreads as domestic interest rates rose, and they continued to enjoy satisfactory asset quality and adequate capital. The insurance industry, on the other hand, faced significant challenges in operations due to sharp drops in global stock and bond markets and the surge of pandemic-related insurance claims. However, the situation improved after regulatory authorities took proactive measures. Bills finance companies also experienced a decline in profitability mainly due to rising interest rates, but their capital remained adequate. On the whole, operations of domestic banks and bills finance companies remain steady, while the insurance industry needs to continue improving its operational conditions.

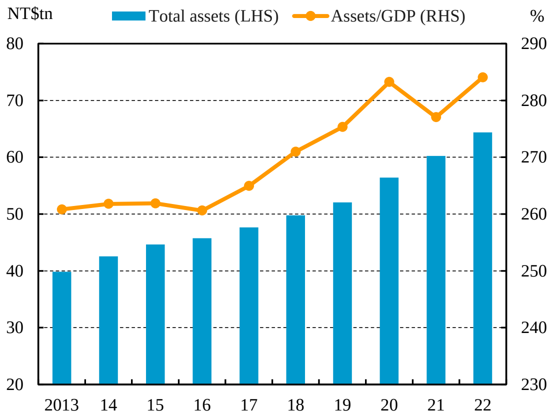
3.2.1 Domestic banks

In 2022, the total assets of domestic banks[36] continued to expand, while asset quality improved. The sectoral concentration in corporate loans and real estate-related loans declined marginally, and exposures to China continued to decline. The estimated value at risk (VaR) of market risk exposures increased, but its impacts on capital adequacy ratios were limited. Liquidity in the banking system was ample, and overall liquidity risk remained relatively low. The profitability of domestic banks significantly strengthened in 2022, reaching a near 20-year high. The average capital adequacy ratio declined marginally, but the capacity to bear losses remained satisfactory.

Total assets kept growing

The total assets of domestic banks kept growing and reached NT$64.39 trillion at the end of 2022, with an annual growth rate of 6.91% compared to 6.78% a year earlier, while the ratio of total assets to annual GDP also rose to 284.06% (Chart 3.15). Broken down by sector, the annual asset growth rates of offshore banking units (OBUs) and overseas branches trended upwards sharply, whereas the rate of domestic

Chart 3.15 Total assets of domestic banks



Sources: CBC and DGBAS.

[36] Includes Agricultural Bank of Taiwan.

banking units (DBUs) continued to decline (Chart 3.16).

Credit risk

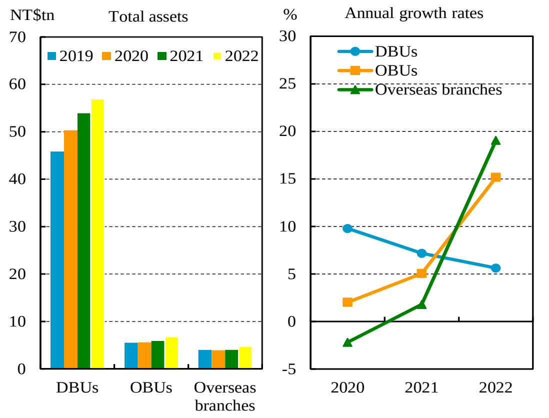
Customer loans growth slowed

Customer loans were the major source of credit risks for domestic banks. The outstanding customer loans of DBUs stood at NT$32.48 trillion at the end of 2022, accounting for 50.60% of total assets with an annual growth rate of 8.44% (Chart 3.17). Among them, the annual growth rate of household borrowing declined to 6.42% owing to weakening demand for mortgage loans, while the growth rate of corporate loans rose to 11.92%, driven by rising funding demand after the pandemic eased. However, the annual growth rate of government loans dropped to -2.17% mainly because increasing government tax revenues lessened the demand for bank borrowing.

The share of real estate-secured credit declined marginally

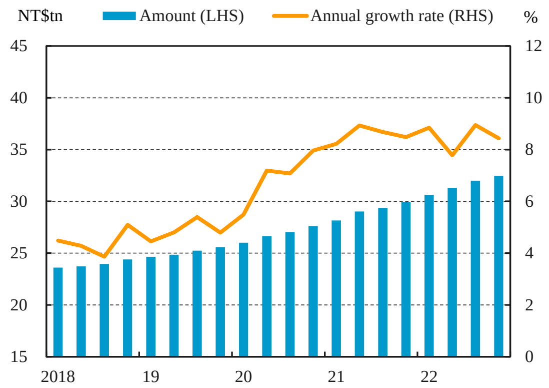
At the end of 2022, real estate-secured credit granted by domestic banks dropped slightly to NT$22.23 trillion, accounting for 57.67% of total credit [37] (Chart 3.18). As the government's measures to curb real estate speculation showed positive effects, the transactions in the housing market became more conservative. This, coupled with rising

Chart 3.16 Total assets of domestic banks by sector



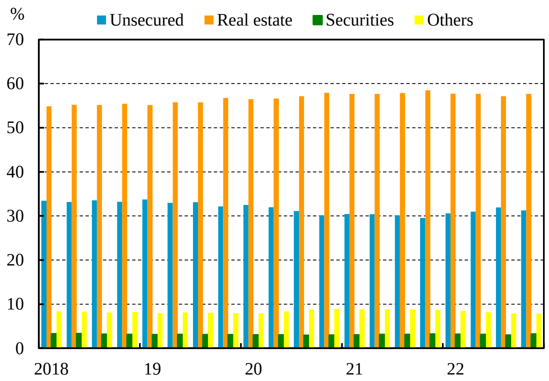
Note: Figures for total assets include interbranch transactions.
Source: CBC.

Chart 3.17 Outstanding loans in domestic banks



Note: Loans of OBUs and overseas branches are excluded.
Source: CBC.

Chart 3.18 Credit by type of collateral in domestic banks



Source: CBC.

[37] The term "credit" herein includes loans, guarantee payments receivable, and acceptances receivable.

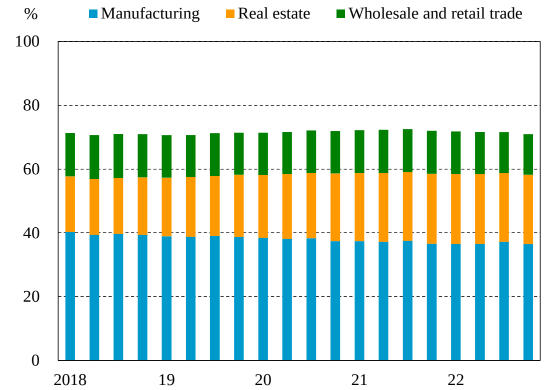
interest rates on bank loans, could pose greater challenges for some medium or small-sized construction companies with poor financial conditions. Against this backdrop, the impact of changes in the real estate market on banks' credit quality warrants close attention.

Credit concentration in corporate loans slightly decreased

Corporate loans granted by the DBUs of domestic banks stood at NT$14.38 trillion at the end of 2022. Among the borrowers, the largest three industries accounted for 70.90%, slightly lower than the 72.04% of the previous year (Chart 3.19), indicating that credit concentration in corporate loans reduced mildly. Among loans to the manufacturing sector,[38] which represented the highest segment, loans to the electronics industry constituted the largest share at 31.88%, slightly increasing from 31.42% the previous year.

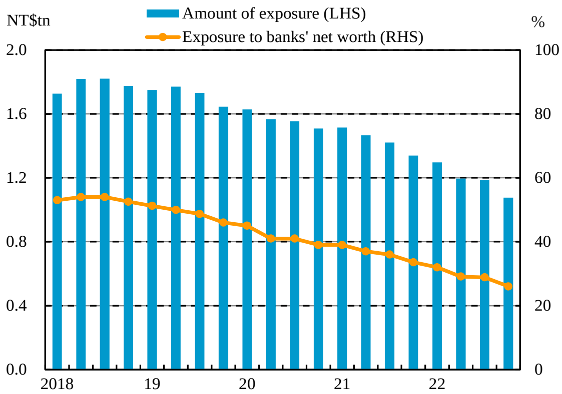
Exposures to China decreased persistently, but potential risks remained high

Chart 3.19 Shares of corporate loans of the three largest industries



Notes: 1. Share of corporate loans = loans to each industry /corporate loans.
2. Exposures of OBUs and overseas branches were excluded.
Source: CBC.

Chart 3.20 Exposures of domestic banks to China



Source: FSC.

At the end of 2022, the exposures of domestic banks to China stood at NT$1.08 trillion, representing a 19.69% decrease from the previous year, mainly attributed to a 37.13% reduction in investments. The above exposures as a percentage of net worth also reached a new low of 26% (Chart 3.20).

Although domestic banks' exposures to China remained relatively low, the potential economic and financial risks in China are still high due to ongoing financing pressures in the

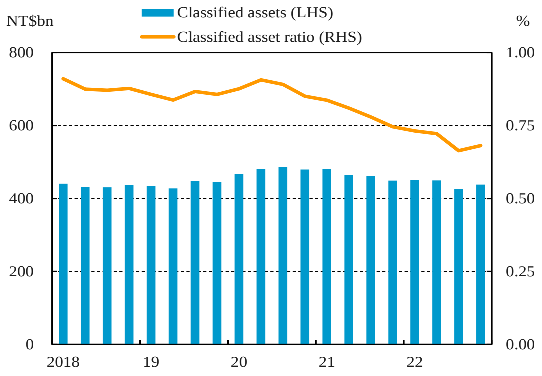
[38] Loans to the manufacturing sector are divided into five categories by industry, including: (1) electronics, (2) mining of metals and non-metals, (3) petrochemicals, (4) traditional manufacturing, and (5) others.

real estate market and the high level of debt burden of local governments, coupled with the escalating US-China technology dispute. Therefore, they warrant continual close attention.

Exposures to related banks in the recent banking turmoil in the US and Europe were limited

Beginning in early March 2023, four small and medium-sized banks in the United States, namely Silicon Valley Bank (SVB), Silvergate Bank, Signature Bank and First Republic Bank, failed or were liquidated one after another. Then, in Europe, UBS acquired financially-distressed Credit Suisse. These events intensified fluctuations in financial markets. According to the statistics of the FSC, domestic banks had no exposure to the four failed US banks as of the end of February 2023, and only small exposure of NT$46.1 billion to Credit Suisse, accounting for 0.07% of total assets of domestic banks. Furthermore, no domestic banks held Credit Suisse's AT1 bonds. This showed that the impact of the turmoil on domestic banks was limited, but their possible spillover effects warrants continual close attention.

Chart 3.21 Classified assets of domestic banks



Note: Classified asset ratio = classified assets/total assets.
Source: CBC.

Asset quality improved

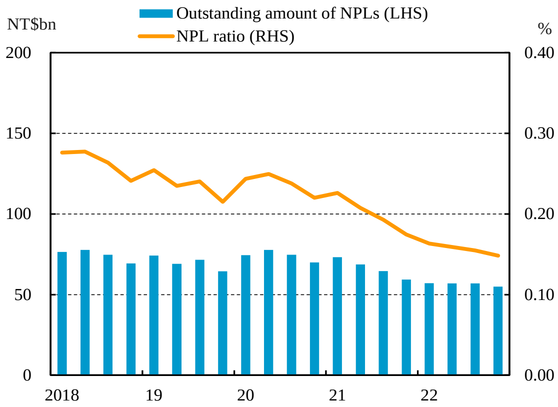
The outstanding classified assets[39] of domestic banks decreased by 2.39% from a year earlier to NT$438.4 billion at the end of 2022. The average classified asset ratio also slightly decreased by 0.07 pps from the end of the previous year and stood at 0.68% (Chart 3.21), showing that the asset quality of domestic banks improved. Although the expected losses of classified assets[40] increased by NT$5.0 billion from a year earlier to NT$50.2 billion, they only accounted for 9.11% of allowances for doubtful accounts and loss provisions, indicating sufficient provisions to cover expected losses without eroding equity.

[39] Assets of domestic banks are broken down into five categories: normal, special mention, substandard, doubtful, and loss. The term "classified assets" herein includes all assets classified under the latter four categories.

[40] Loss herein refers to losses from loans, acceptances, guarantees, credit cards, and factoring without recourse.

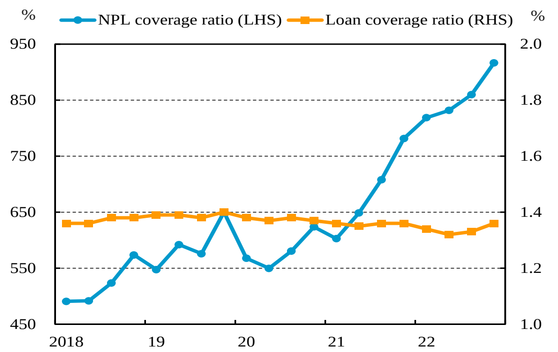
The outstanding NPLs of domestic banks registered NT$55.0 billion at the end of 2022, decreasing by 7.36% from the end of the previous year. The average NPL ratio also declined to a record low of 0.15% (Chart 3.22). In addition, at the end of 2022, the loan coverage ratio remained at 1.36%, whereas the NPL coverage ratio increased significantly to 916.53% (Chart 3.23) due to a greater decrease in NPLs. The overall ability of domestic banks to compensate potential loan losses remained satisfactory.

Chart 3.22 NPLs of domestic banks



Note: Excludes interbank loans.
Source: CBC.

Chart 3.23 NPL coverage ratio and loan coverage ratio of domestic banks



Notes: 1. NPL coverage ratio = total provisions/non-performing loans.
2. Loan coverage ratio = total provisions/total loans.
3. Excludes interbank loans.
Source: CBC.

Market risk

Estimated value-at-risk for market risk exposures increased

Based on the Bank's VaR model,[41] the estimated total VaR for market risk exposures of domestic banks stood at NT$169.3 billion at the end of 2022, increasing by NT$16.2 billion or 10.58% compared to a year earlier. Among the market risk exposures, the interest rate VaR rose by 14.50% year on year in 2022. This mainly resulted from a surge in bond yield volatility because of the sharp tightening of monetary policies implemented by central banks in many countries to rein in inflation. The FX VaR also increased by 33.33% owing to elevated volatility in the NT dollar exchange rate against the US dollar. However, the equities VaR declined by 26.88% compared to the previous year, reflecting a substantial reduction of 47.28% in the net position of equity securities (Table 3.1).

[41] For more details about the Bank's VaR model, please see CBC (2016), Box 2, *Financial Stability Report*.

Table 3.1 Market risks in domestic banks

Unit: NT$bn

Type of risk	Item	End-Dec. 2021	End-Dec. 2022	Changes	
				Amount	pps
Foreign exchange	Net position	200.2	200.5	0.3	0.15
	VaR	3.3	4.4	1.1	33.33
	VaR/net position (%)	1.65	0.219		0.54
Interest rate	Net position	2,001.3	1,760.9	-240.4	-12.01
	VaR	133.8	153.2	19.4	14.50
	VaR/net position (%)	6.69	8.70		2.01
Equities	Net position	112.3	59.2	-53.1	-47.28
	VaR	16.0	11.7	-4.3	-26.88
	VaR/net position (%)	14.25	19.76		5.51
Total VaR		153.1	169.3	16.2	10.58

Source: CBC.

The impacts of market risk on capital adequacy ratios were limited

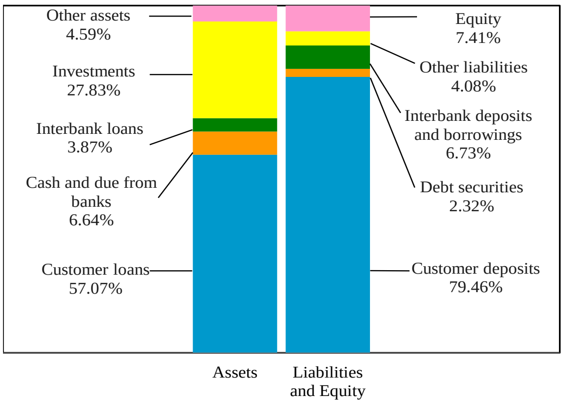
According to the estimation mentioned above, the total VaR would lead to a decrease of 0.49 pps[42] in the average capital adequacy ratio of domestic banks, causing the ratio to drop from the current 14.68% to 14.19%. Nevertheless, it would still be higher than the statutory minimum of 10.5%. Considering that market panic over the banking turmoil in the US and Europe lingered on and the uncertainty of subsequent developments is also high, market risk could further increase and therefore warrants close attention.

Liquidity risk

Liquidity in the banking system remained ample

The asset and liability structure of domestic banks remained roughly unchanged in 2022. For the sources of funds, customer deposits,

Chart 3.24 Asset/liability structure of domestic banks



Notes: 1. Figures are as of end-December 2022.
2. Equity includes loss provisions. Interbank deposits include deposits with the CBC.
Source: CBC.

[42] Domestic banks had already set aside capital for market risk in accordance with relevant regulations. To avoid double counting, the impacts of market risk on the capital adequacy ratio herein were estimated using capital shortfalls after considering the aforementioned market risk capital.

which tend to be relatively stable, still made up the largest share with 79.46% of the total, followed by equity at 7.41%. As for the uses of funds, customer loans accounted for the biggest share with 57.07%, followed by securities investments at 27.83% (Chart 3.24).

At the end of 2022, the average deposit-to-loan ratio of domestic banks slightly dropped to 141.14%, and the funding surplus (i.e., deposits exceeding loans) was NT$15.25 trillion (Chart 3.25). The overall liquidity of domestic banks remained abundant.

Overall liquidity risk remained relatively low

The average NT dollar liquid reserve ratio of domestic banks was well above the statutory minimum of 10% in every month of 2022 and stood at 28.31% in December (Chart 3.26).

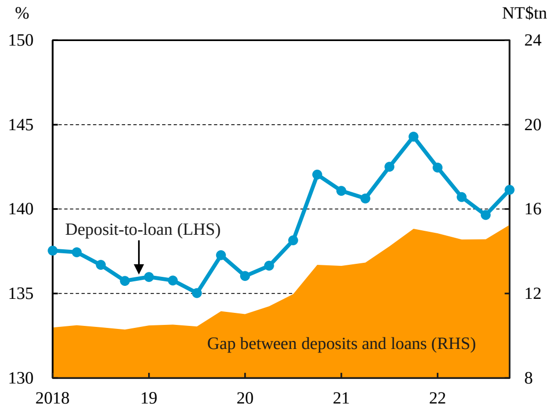
At the end of 2022, the average liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) of domestic banks marginally dropped to 134% and 138%, respectively (Chart 3.27). However, all banks met the statutory minimum LCR and NSFR requirements, indicating that the overall liquidity risk of domestic banks was relatively low.

Profitability

Profits in 2022 reached the highest level in nearly 20 years

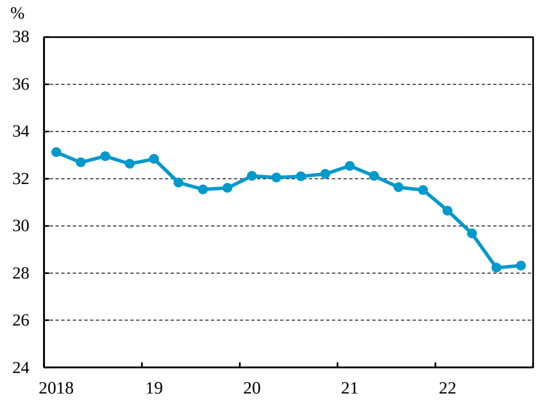
Benefiting from a substantial pickup in net interest income owing to expanding interest

Chart 3.25 Deposit-to-loan ratio of domestic banks



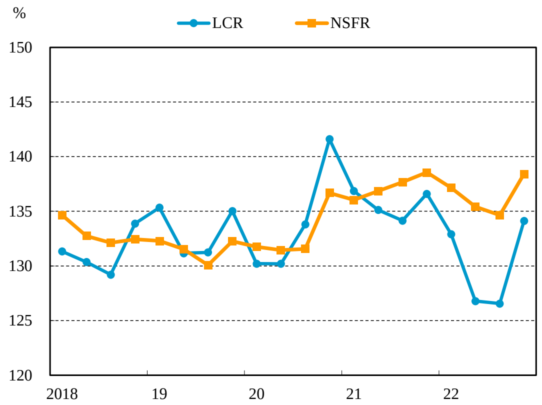
Note: Deposit-to-loan ratio = total deposits/total loans.
Source: CBC.

Chart 3.26 Liquid reserve ratio of domestic banks



Note: Figures are the average daily data in the last month of each quarter.
Source: CBC.

Chart 3.27 LCR and NSFR of domestic banks



Source: CBC.

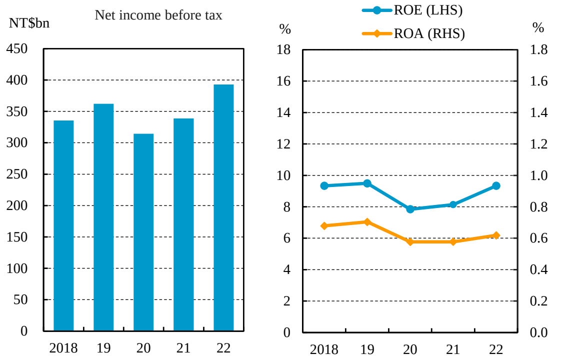
rate spreads between deposits and loans and increasing interest revenue from debt instruments, the net income before tax of domestic banks in 2022 increased by 15.97% over the previous year to NT$392.8 billion, a record high in nearly 20 years. The average ROE and ROA also went up to 9.33% and 0.62%, respectively, indicating improved profitability (Chart 3.28).

In 2022, three internet-only banks, which officially began operations in the last two years, posted operating losses, whereas all the other banks made profits. Most banks' ROEs and ROAs were higher than the previous year. Fourteen banks achieved a profitable ROE of 10% or more, compared to five banks in 2021. Meanwhile, three banks recorded ROAs above the international standard of 1%, more than two banks in 2022 (Chart 3.29).

Factors that might affect future profitability

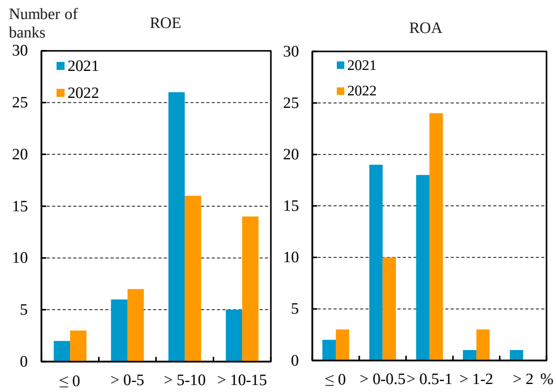
Affected by the Bank's policy rate hikes in 2022, the average interest rate spread between deposits and loans of domestic banks notably rose to 1.36% at the end of 2022 from 1.24% a year earlier (Chart 3.30), which helped to strengthen the profitability of domestic banks. However, there are still some uncertainties which warrant close attention: (A) Financial markets are increasingly sensitive to the expectations of the Fed's future rate-hike path, and there are still uncertainties regarding the subsequent developments of the recent turmoil in the US and European banking sectors, which could further increase volatility in global

Chart 3.28 Net income before tax of domestic banks



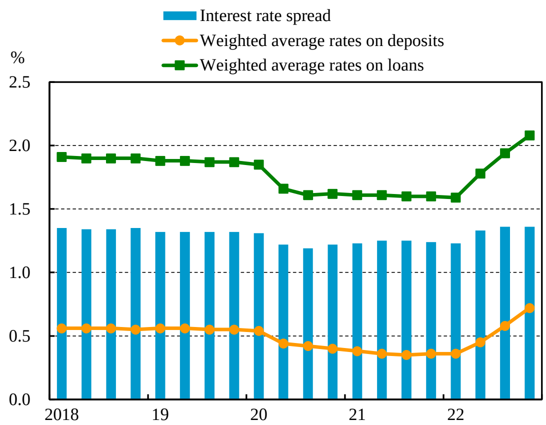
Notes: 1. ROE = net income before tax/average equity.
2. ROA = net income before tax/average assets.
Source: CBC.

Chart 3.29 Domestic banks classified by ROE and ROA



Source: CBC.

Chart 3.30 Interest rate spread of domestic banks



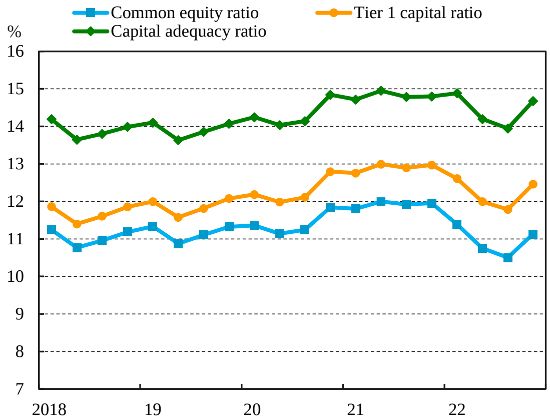
Notes: 1. Interest rate spread = weighted average interest rates on loans - weighted average interest rates on deposits.
2. The weighted average interest rates on deposits and loans exclude preferential deposits of retired government employees and central government loans.
Source: CBC.

financial markets, thus affecting banks' returns on investment. (B) A significant slowdown in the global economic and trade momentum, together with weak customer demand and manufacturers' continuous inventory adjustments, might suppress Taiwan's export momentum and impair corporate profit growth and debt-servicing capabilities, consequently affecting banks' profitability and credit quality.

Capital adequacy

Capital ratios slightly descended

Chart 3.31 Capital ratios of domestic banks



Notes: 1. Common equity ratio = common equity Tier 1 capital/risk-weighted assets.
2. Tier 1 capital ratio = Tier 1 capital/risk-weighted assets.
3. Capital adequacy ratio = eligible capital/risk-weighted assets.

Source: CBC.

In 2022, influenced by an increase in unrealized valuation losses on debt instrument investments and dividend distributions, the regulatory capital of domestic banks decreased. Meanwhile, an increase in loans led to the expansion in risk-weighted assets. As a result, the average common equity ratio, Tier 1 capital ratio, and capital adequacy ratio dropped to 11.13%, 12.46%, and 14.68%, respectively, at the end of 2022 (Chart 3.31). Among the components of regulatory capital, common equity Tier 1 (CET 1) capital accounted for 75.86%. The high share of CET1 capital, which features the best loss-bearing capacity, showed that the capital quality of domestic banks was satisfactory.

Moreover, the average leverage ratio of domestic banks stood at 6.28% at the end of 2022, marginally lower than 6.46% a year earlier but still above the 3% statutory standard, indicating that financial leverage remained sound.

All domestic banks had capital ratios and leverage ratios higher than the statutory minimum

At the end of 2022, the capital ratios of six domestic systemically important banks (D-SIBs) and non-D-SIBs were all above statutory minimum standards or the relevant capital buffer requirements set by the FSC in 2022.[43] Leverage ratios of all domestic banks also exceeded the statutory minimum of 3%.

[43] The statutory standards for the common equity ratio, Tier 1 capital ratio, and capital adequacy ratio of non-D-SIBs are 7%, 8.5% and 10.5%, respectively. D-SIBs are required to set aside an additional 2% of buffer capital and 2% of internal management capital according to the requirement of the FSC. The additional capital must be achieved before the end of each of the four years equally starting from the next year after the designated date (the enforcement of the internal management capital requirement was postponed for one year and must be achieved before each year-end of the four years equally from 2022 onwards).

Credit ratings

Average credit rating level remained steady

Of the overall risk assessments of Taiwan's banking system made by credit rating agencies, Standard & Poor's kept Taiwan's Banking Industry Country Risk Assessment (BICRA)[44] unchanged at Group 4 with moderate risk. Compared to other Asian economies, the systemic risk level of Taiwan was the same as that of Malaysia, but much lower than those of the Philippines, China, Thailand and Indonesia. Moreover, the assessment of Taiwan's banking system by Fitch Ratings in its Banking System Indicator/ Macro-Prudential Indicator (BSI/MPI)[45] also remained unchanged at level bbb/2 (Table 3.2).

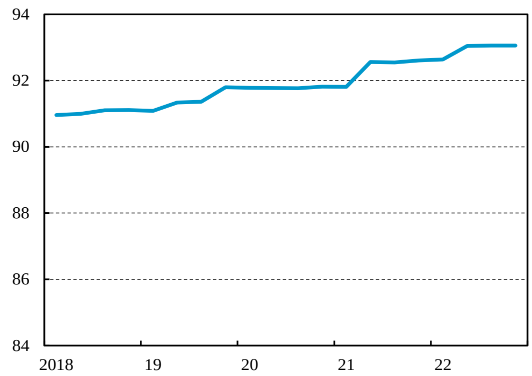
Moreover, the weighted average credit rating index[46] went up slightly compared to the previous year owing to the upgrading of four banks (Chart 3.32).

Table 3.2 Systemic risk indicators for the banking system

Banking System	Standard & Poor's		Fitch	
	BICRA		BSI/MPI	
	2022/2	2023/2	2021/8	2022/7
Singapore	2	2	aa/2	aa/2
Hong Kong	2	2	a/2	a/2
Japan	3	3	a/2	a/3
South Korea	3	3	a/2	a/2
Taiwan	**4**	**4**	**bbb/2**	**bbb/2**
Malaysia	4	4	bbb/1	bbb/1
Philippines	5	5	bb/1	bb/1
China	6	6	bb/1	bb/1
Thailand	6	7	bbb/1	bbb/1
Indonesia	6	6	bb/1	bb/1

Sources: Standard & Poor's and Fitch Ratings.

Chart 3.32 Credit rating index of domestic banks



Sources: Taiwan Ratings, Fitch Ratings and CBC.

Rating outlooks for every rated bank remained stable or positive

As of the end of 2022, all but one domestic bank received ratings by credit rating agencies. Most of the rated domestic banks maintained credit ratings of twAA/twA (Taiwan Ratings) or AA(twn)/A(twn) (Fitch Ratings) and none had credit ratings lower than twBB/BB(twn) (Chart 3.33). Rating outlooks for all rated banks remained stable or positive.

[44] BICRA is scored on a scale from 1 to 10, ranging from the lowest-risk (group 1) to the highest-risk (group 10), which indicates the assessment results by Standard & Poor's of economic and industry risks of a country's banking system.

[45] Fitch Ratings assesses banking system vulnerability with two complementary measures, the BSI and the MPI. These two indicators are brought together in a Systemic Risk Matrix. The BSI represents banking system strength on a scale from aaa, aa, a, bbb, bb, b, ccc, cc, c and f. The MPI indicates the vulnerability of the macro environment on a scale from 1, 2, 2* and 3.

[46] The credit rating index is an asset-weighted average rating score of rated domestic banks, measuring the overall creditworthiness of those banks on a scale from 1 (weakest) to 100 (strongest). The rating score for banks is determined according to their long-term issuer ratings from Taiwan Ratings or national long-term ratings from Fitch Ratings. The higher the index is, the better the bank's overall solvency.

Taiwan Ratings projected that Taiwan's banking industry outlook remained stable in 2023, and indicated that domestic banks' adequate capital levels could help offset a possible increase in credit losses arising from the domestic economic slowdown.[47]

3.2.2 Insurance companies

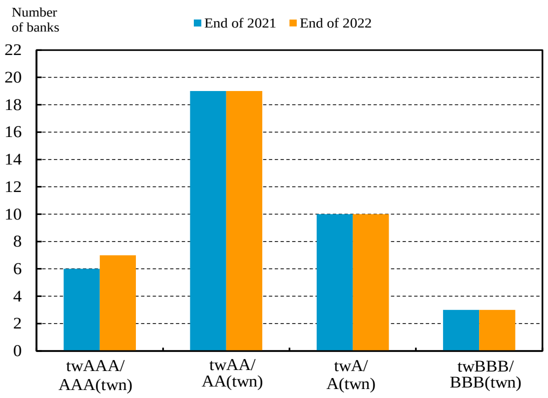
Life insurance companies

In 2022, the total assets of life insurance companies grew at a slower pace and their profits slumped. The average equity to asset ratio rebounded after a sharp drop, and overall credit ratings remained stable. However, owing to the expansion of foreign investment positions, life insurance companies still faced higher FX risk, interest rate risk and equity risk.

Assets grew at a slower pace

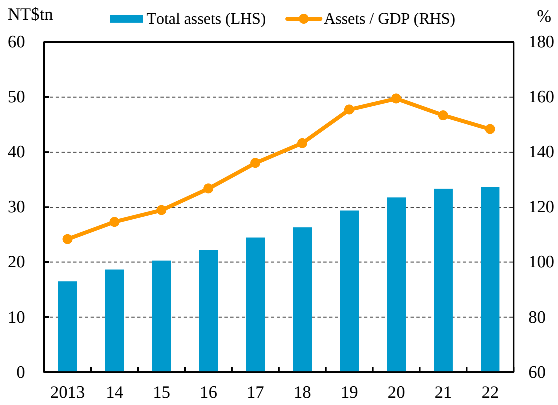
The total assets of life insurance companies reached NT$33.62 trillion at the end of 2022, equivalent to 148.34% of annual GDP (Chart 3.34). The annual growth rate of total assets slowed markedly to 0.84% from 5.00% a year earlier. The market structure of the life insurance industry remained roughly unchanged in 2022, with the top three companies in terms of assets making up a combined market share of 54.61%.

Chart 3.33 Number of domestic banks classified by credit ratings



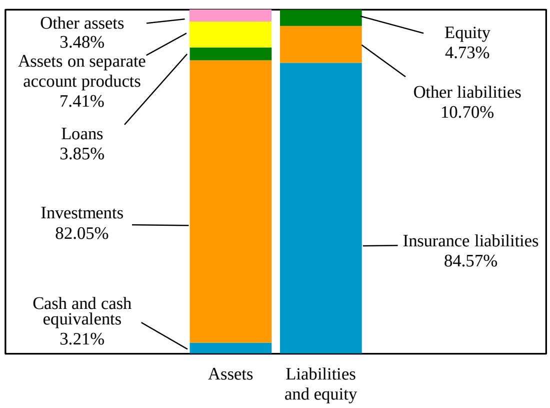
Sources: Taiwan Ratings and Fitch Ratings.

Chart 3.34 Total assets of life insurance companies



Sources: FSC and DGBAS.

Chart 3.35 Asset/liability structure of life insurance companies



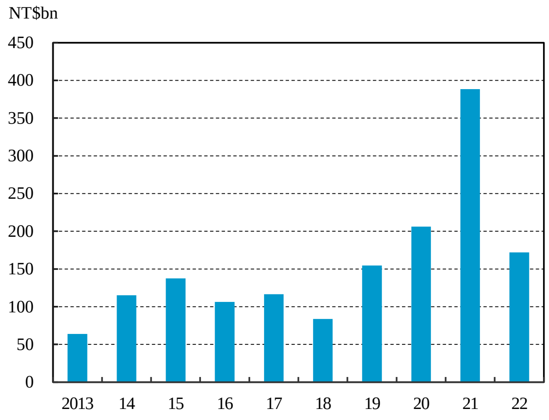
Note: Figures are as of the end of 2022.
Source: FSC.

[47] Press release by Taiwan Ratings on December 21, 2022.

Investment positions continued to grow

In terms of the usage of funds of life insurance companies as of the end of 2022, investments continued to take up the primary share of total assets, which rose to 82.05% owing to the expansion of foreign investments.[48] As for the sources of funds, insurance liabilities accounted for the largest share of 84.57%, while the share of equity decreased to 4.73% mainly owing to the expansion of unrealized valuation losses from financial assets and a sharp decline in profits (Chart 3.35).

Chart 3.36 Net income before tax of life insurance companies

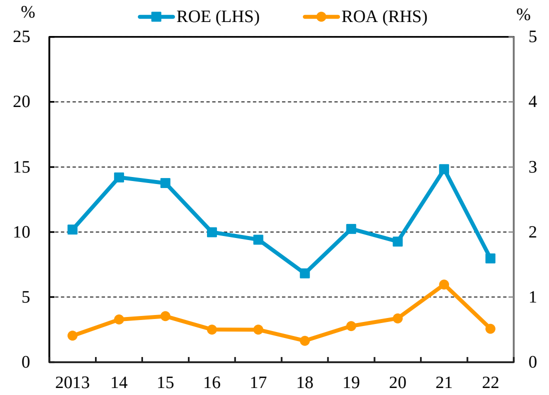


Source: FSC.

Pretax income slumped

Life insurance companies reported net income before tax of NT$171.9 billion in 2022, a substantial year-on-year decrease of 55.75% from NT$388.5 billion a year earlier (Chart 3.36). This mainly resulted from a huge reduction in investment revenue as the loss on valuation of financial assets expanded, which was influenced by the decline in international stock and bond markets. Accordingly, their average ROE and ROA dropped to 7.97% and 0.51%, respectively, from 14.83% and 1.19% a year earlier (Chart 3.37), indicating a deterioration in profitability.

Chart 3.37 ROE & ROA of life insurance companies



Notes: 1. ROE = net income before tax/average equity.
2. ROA = net income before tax/average assets.
Source: FSC.

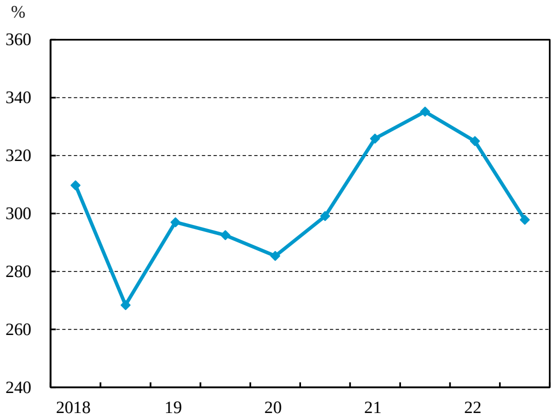
Average RBC ratio and equity to asset ratio both decreased

In 2022, the total capital of life insurance companies fell because of a slump in international stock and bond markets. As a result, the average RBC ratio decreased to 297.82% at the end of the year from 335.17% a year earlier (Chart 3.38). Among them, one life insurance company had an RBC ratio below the statutory minimum of 200%.

[48] Foreign investments and domestic portfolio investments (including investments in insurance-related enterprises) made up 63.01% and 16.32% of total assets, respectively.

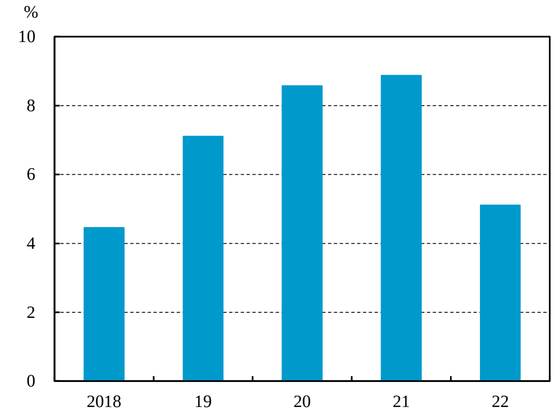
Furthermore, the average equity to asset ratio continued to drop in the first three quarters of 2022, affected by the Fed's rapid interest rate hikes and the adoption of different accounting treatments for evaluating insurers' assets and liabilities.[49] Afterwards, with some life insurance companies conducting cash capital increases or financial asset reclassification, the ratio climbed to 5.11% at the end of 2022, still far below the 8.87% registered a year earlier (Chart 3.39). The number of life insurance companies with equity to asset ratios below the statutory minimum of 3% was four at the end of 2022, but the number shrank to two as of the end of March 2023.

Chart 3.38 RBC ratio of life insurance companies



Notes: 1. RBC ratio = regulatory capital/risk-based capital.
2. Figures are exclusive of life insurance companies in receivership.
Source: FSC.

Chart 3.39 Equity to asset ratios of life insurance companies



Notes: 1. For equity, unaudited figures are used.
2. For assets, the assets of investment-linked insurance products in separate accounts are excluded.
Source: FSC.

Overall credit ratings remained stable

Among the 14 life insurance companies rated by credit rating agencies in 2022, only one life insurance company was downgraded to twA from twA+ by Taiwan Ratings because of its weakened capital level, while ratings for the other companies remained unchanged. As of the end of the year, all rated life insurance companies maintained credit ratings above twA or its equivalent, with the ratings of the top three companies in terms of assets holding at twAA, which means a very strong capacity to meet their financial commitments. As for the prospects of these companies, most of them were rated with a positive or stable outlook, except for two companies being rated with a negative outlook.

Taiwan Ratings indicated[50] that the decline in the life insurance premium income is expected to slow down in 2023. However, the spiking volatility in financial markets and the expansion

[49] The financial assets of the insurance industry are measured at fair value in compliance with IFRS 9, while the insurance liabilities are discounted at the predetermined interest rate at the issuance of the policies and are not reassessed when interest rates change. Consequently, when market interest rates rise, the asset side reflects the unrealized valuation losses, but the liability side does not reflect the valuation gains therefrom, causing a reduction in equity.

[50] Taiwan Ratings (2022), "2023 Taiwan Credit Outlook," December.

of FX hedging costs will affect life insurers' profitability and capital adequacy throughout the year. The resultant challenges in their credit outlook warrant close attention.

Foreign investment positions faced higher market risk and systemic risk

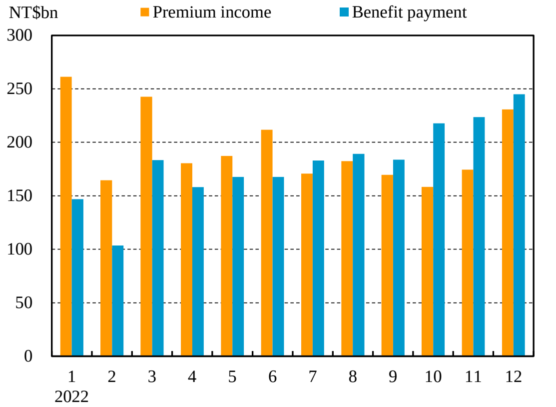
Foreign investment positions of life insurance companies grew continuously and reached NT$21.19 trillion at the end of 2022. Securities investments constituted the largest share, of which about 90% were invested in bills and bonds and 10% in equities. Although the Fed slowed down the pace of interest rate hikes recently, the volatility in stock markets increased owing to concerns about multiple downside risks which might adversely affect the global economic outlook. In addition, global bond yields remained high. As a result, life insurance companies still faced higher equity risk and interest rate risk.

Furthermore, more than 90% of foreign investment positions of life insurance companies were denominated in US dollars. In order to alleviate the impacts of exchange rate fluctuations, life insurance companies actively used derivative financial instruments for FX hedging, as well as building up FX valuation reserves in compliance with the relevant regulations. However, the FX risk inherent in large-value open FX positions of life insurance companies still warrants close attention. Given that the FX hedging costs for insurance companies surged in 2022, the FSC amended the regulations related to FX valuation reserves and established a new provision (write-off) mechanism for traditional hedging costs in March 2023. The amendments aimed to enable insurers to manage currency risk in a more flexible manner and stabilize hedging costs, thereby strengthening their solvency and financial soundness.

Liquidity risk raised as insurance benefit payment has exceeded premium income

After the Fed accelerated interest rate hikes, the impact from the lower return on USD-denominated insurance policies compared to USD preferential deposit rates and poor investment performance caused the premium income of life insurance companies to significantly decrease by 21.43% in 2022 compared to a year earlier. Furthermore, bearish news such as the decline in total equity of life insurance companies struck

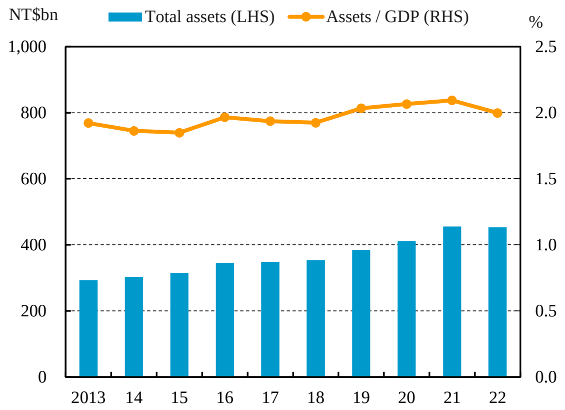
Chart 3.40 Premium income and benefit payment of life insurance companies



Note: Benefit payment includes maturity, survival repayment and termination.
Source: Taiwan Insurance Institute.

policyholders' confidence. As a result, the life insurance benefit payment has exceeded premium income since July 2022 (Chart 3.40). In addition, some life insurance companies reclassified their financial assets to "financial assets measured at amortized cost," which could limit their ability to realize the capital gains from bond investments and place pressure on their cash flows.[51]

Chart 3.41 Total assets of non-life insurance companies



Sources: FSC and DGBAS.

Exposure to the four failed American banks and Credit Suisse was limited and insurers did not hold AT1 bond positions

According to the statistics of the FSC, the exposure of Taiwanese insurers (mainly life insurance companies) to SVB and First Republic Bank was NT$150 million and NT$42 million, respectively, as of the end of February 2023. Meanwhile, the insurance industry did not hold exposure to Signature Bank and Silvergate Bank. Moreover, the exposure to Credit Suisse was NT$109.3 billion, accounting for only 0.35% of the total usable assets, indicating the risks were under control, and no domestic insurers held Credit Suisse's AT1 bonds.

Non-Life Insurance companies

In 2022, the total assets of non-life insurance companies contracted slightly. They reported a significant pretax loss and a decreasing average RBC ratio owing to a drastic surge in COVID-19 insurance claim settlements, but the pressure to settle claims is expected to ease in 2023.

Assets contracted slightly

The total assets of non-life insurance companies reached NT$452.9 billion at the end of 2022, equivalent to 2.00% of annual GDP (Chart 3.41). The annual growth rate of total assets plummeted to -0.56% from 10.63% a year earlier, representing a contraction in the size of total assets. The top three companies in terms of assets made up a combined market share of 46.17%. The market structure of the non-life insurance industry remained roughly unchanged.

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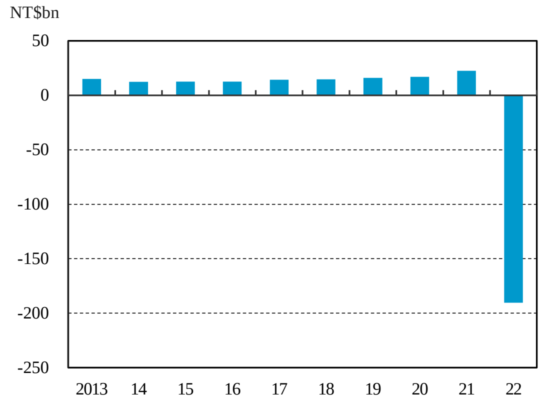
[51] Under the FSC's regulations, the insurance industry is not allowed to sell more than 5% of the original bonds measured at amortized cost each year. When the insurer exceeds the limitation, it will be prohibited from measuring new bonds at amortized cost starting from the next year to 2025 when IFRS 17 is adopted domestically.

Significant pretax loss

Non-life insurance companies reported net income before tax of minus NT$190.5 billion in 2022 owing to a drastic increase in COVID-19 insurance claim settlements (Chart 3.42). Their average ROE and ROA declined to -171.40% and -41.96% from 14.80% and 5.22% a year earlier, respectively. Among 19 non-life insurance companies, ten companies reported a net loss, compared to two companies a year earlier.

Chart 3.42 Net income before tax of non-life insurance companies

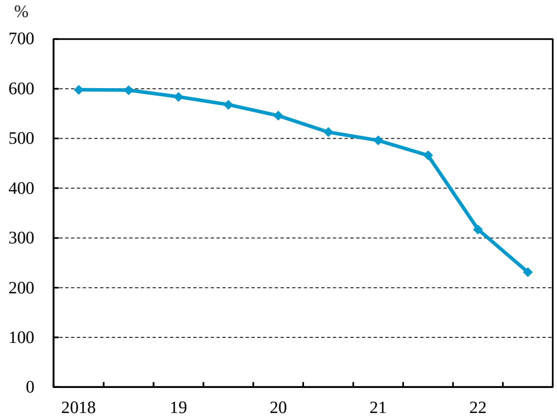


Source: FSC.

Average RBC ratio and equity to asset ratio both decreased

In 2022, total capital in non-life insurance companies fell because of the pretax loss. Correspondingly, the average RBC ratio trended downwards to 231.30%[52] at the end of the year from 466.12% a year earlier (Chart 3.43). Among them, five non-life insurance companies were below the statutory minimum of 200%. Furthermore, the average equity to asset ratio dropped to 15.14% from 35.20% at the end of the previous year, with four non-life insurance companies recording ratios below the statutory minimum of 3%.

Chart 3.43 RBC ratio of non-life insurance companies



Note: RBC ratio = regulatory capital/risk-based capital.
Source: FSC.

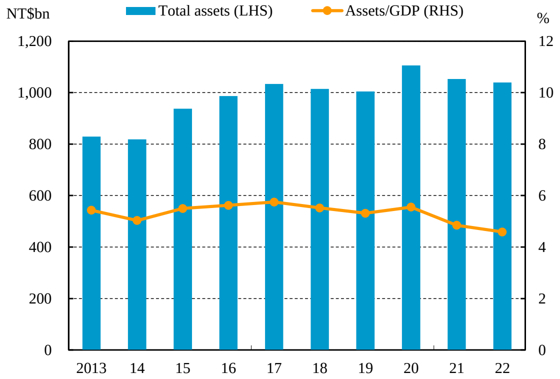
COVID-19 insurance claim settlements surged in 2022, while the pressure is expected to ease in 2023

Many non-life insurance companies issued COVID-19 insurance policies in early 2022. Afterwards, as the government relaxed some of the pandemic containment measures, the number of infections surged and, as a result, COVID-related claim settlements increased. Consequently, the total payout of quarantine and vaccine insurance reached NT$211.6 billion

52 RBC data of the non-life insurance companies is reported on a semiannual basis.

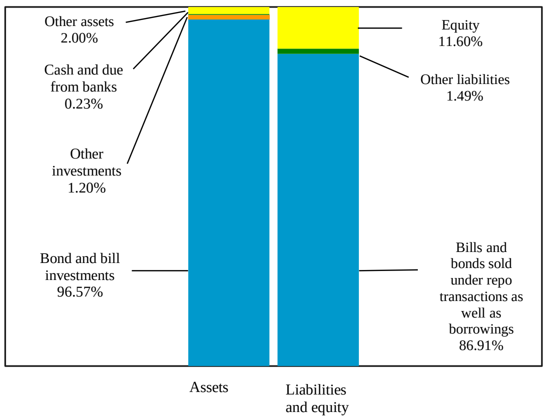
in 2022.[53] Considering that some non-life insurers could not afford large claim settlements, the FSC approved certain insurers to borrow funds to cover these large payments. Additionally, in order to stabilize the insurance market and maintain the operational capabilities of insurance enterprises, the FSC provided several financing-related measures to insurers in September 2022. In the beginning of 2023, as the pandemic eased and COVID-19 insurance policies gradually expired without renewal, the number and amount of related claims decreased gradually and are expected to ease insurers' pressure of claim settlements.

Chart 3.44 Total assets of bills finance companies



Sources: CBC and DGBAS.

Chart 3.45 Asset/liability structure of bills finance companies



Note: Figures are as of the end of 2022.
Sources: CBC and FSC.

3.2.3 Bills finance companies

In 2022, the total assets of bills finance companies decreased, along with a reduction in their guarantee business. However, the concentration of credit secured by real estate remained high, while credit asset quality remained sound. Although the capital adequacy ratio increased due to the reduction in risk-weighted assets, profitability declined significantly. Moreover, liquidity risk and interest rate risk remained high.

Total assets decreased

The total assets of bills finance companies stood at NT$1,039.6 billion at the end of 2022, a decrease of 1.29% compared to a year earlier, mainly owing to substantial valuation losses on bond investments. The ratio of their total assets to annual GDP dropped continually to 4.59% over the same period (Chart 3.44).

With respect to the asset and liability structure of bills finance companies, bill and bond

[53] The claim settlements of quarantine and vaccine insurance were NT$169.3 and NT$42.3 billion, respectively.

investments constituted the largest share of 96.57% of total assets as of the end of 2022. On the liability side, bills and bonds sold under repo transactions as well as borrowings accounted for 86.91% of total assets, while the proportion of equity accounted for 11.60% (Chart 3.45). The asset and liability structure remained roughly unchanged compared to a year earlier.

Credit risk

Guarantee liabilities decreased, but the concentration of credit secured by real estate remained high

The amount of CP guaranteed by bills finance companies registered NT$548.8 billion at the end of 2022, decreasing by 13.12% year on year. This decline was primarily because the widening valuation losses on financial assets eroded capital. To maintain a satisfactory capital adequacy ratio, bills finance companies reduced their CP guarantee business. As a result, the average ratio of guarantee liabilities to equity decreased to a multiple of 4.24 times, and the ratio for each company remained below the regulatory ceiling of 5.5 times.

At the end of 2022, guarantees granted to the real estate and construction industries and credit secured by real estate rose to 31.45% and 42.05%, respectively, of the total credit of bills finance companies. Meanwhile, the proportion of real estate industry guarantees registered 27.60%, still below the regulatory ceiling of 30%, but the overall concentration of credit secured by real estate remained high. Considering the recent conservative prospects of the domestic real estate market, elevated pressure on the clearance of unsold new residential housing units, and the potential financial health deterioration of some small and medium-sized construction companies, bills finance companies should monitor closely the above-mentioned impacts on the asset quality of mortgage-related credit.

Guaranteed advances ratio rose but credit quality remained sound

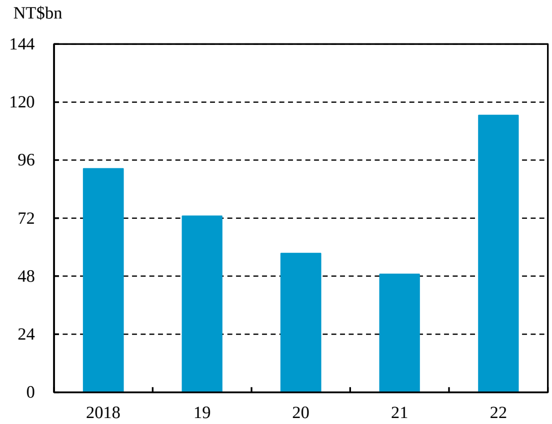
At the end of 2022, the guaranteed advances ratio of bills finance companies was 0.16%, higher than 0.01% a year earlier yet still reflecting sound credit quality. Although the credit loss reserves to guaranteed advances ratio[54] decreased to 8.40 times due to the increase in guaranteed advances, the provision was still sufficient to cover potential credit losses.

[54] Credit loss reserves to guaranteed advances ratio = (provisions + loss reserves to guarantees)/guaranteed advances.

Investment in non-guaranteed CP issued by the leasing industry expanded continually and its potential credit risk warrants attention

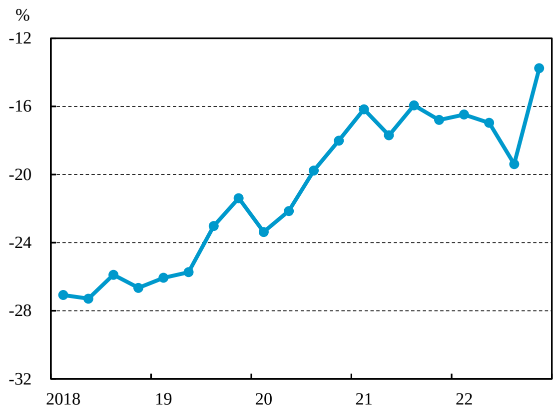
The non-guaranteed CP investment of bills finance companies stood at NT$114.5 billion at the end of 2022, representing a significant increase of 134.41% year on year (Chart 3.46). This increase was primarily because the anticipation of rising interest rates and tight market liquidity impacted the willingness of counterparties to purchase bills and, in turn, hampered the ability of the bills finance companies to offload their underwriting positions. Each company's ratio of non-guaranteed CP investment to equity remained below the self-disciplinary ceiling of 2 times. However, the investment in non-guaranteed CP issued by the leasing industry kept increasing, reaching NT$34.1 billion during the same period. The leasing industry may pose a higher potential credit risk owing to the fact that it tends to rely on short-term sources for funding long-term investments, hence warranting close attention to the impact on the asset quality of bills finance companies.

Chart 3.46 Outstanding amount of non-guaranteed CP investments of bills finance companies



Source: CBC.

Chart 3.47 0-30 day maturity gap ratio of bills finance companies



Note: 0-30 day maturity gap ratio = net NTD cash flow within 0-30 days/total assets denominated in NTD.
Source: CBC.

Liquidity risk remained high

Bills finance companies still faced a significant maturity mismatch between assets and liabilities. At the end of 2022, more than 80% of their funding sources relied on short-term interbank borrowing and repurchase agreements with financial institutions. Furthermore, more than 90% of their assets were invested in bills and bonds as of the end of the year, 40.83% of which were long-term bonds, reflecting a significant maturity mismatch between assets and liabilities. Nevertheless, bills finance companies' ratio of 0-30 day maturity gap to total NTD-denominated assets shrunk further and registered -13.76% at the end of the year (Chart 3.47), reflecting a declining but still high liquidity risk.

The average ratio of major liabilities[55] to equity increased slightly to 7 times at the end of 2022 because the expansion in bill and bond repo transactions held by bills finance companies resulted in an increase in major liabilities and led to a higher degree of financial leverage. Moreover, the leverage ratios of all bills finance companies stayed below the regulatory ceilings of 10 or 12 times.

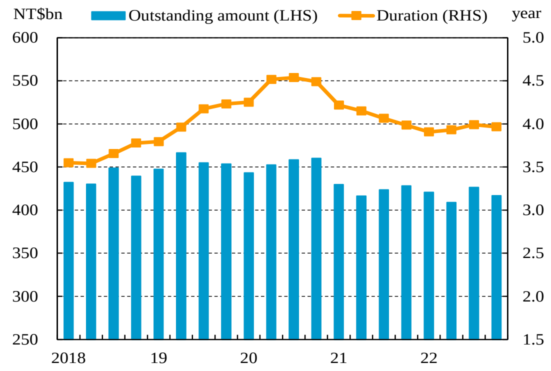
Interest rate risk of bond investments remained high

In 2022, the outstanding amount of fixed-rate bond investments of bills finance companies decreased by 2.65% to NT$416.9 billion with the average duration shortening to 3.97 years (Chart 3.48). Taiwan government bond yields dropped gradually recently. However, considering the uncertain future trajectory of monetary policy, the global bond market might continue to face correction pressure. The interest rate risk of bills finance companies' bond investments remained high, warranting close attention.

Pretax income decreased significantly and profitability declined

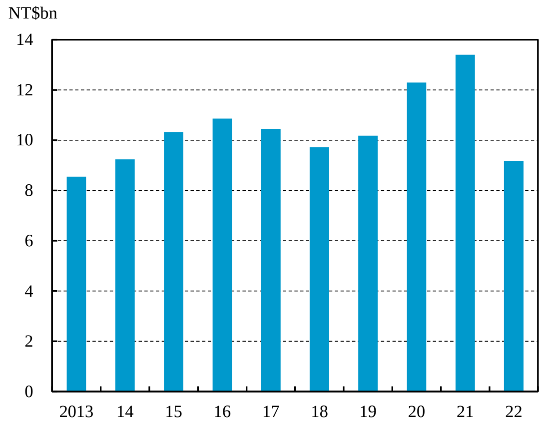
The net income before tax of bills finance companies decreased by 31.54% year on year

Chart 3.48 Outstanding amount of fixed-rate bond investments and bond duration of bills finance companies



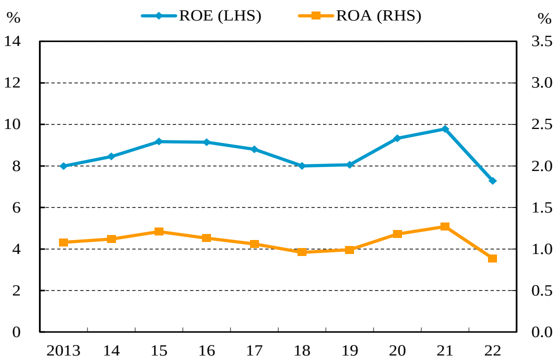
Source: FSC.

Chart 3.49 Net income before tax of bills finance companies



Source: CBC.

Chart 3.50 ROE & ROA of bills finance companies



Notes: 1. ROE = net income before tax/average equity.
2. ROA = net income before tax/average assets.
Source: CBC.

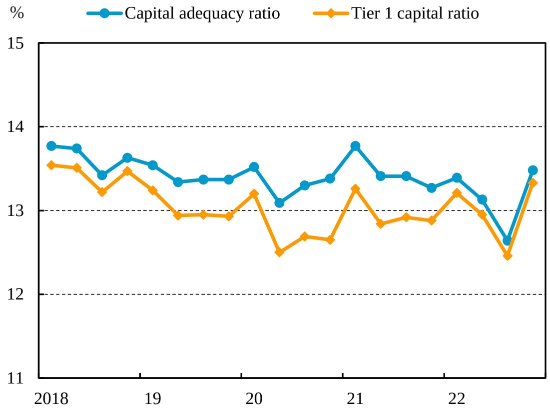
[55] Major liabilities include call loans, repo transactions, as well as issuance of corporate bonds and CP.

to NT$9.2 billion in 2022 (Chart 3.49) owing to an increase in interest expenses and a reduction in gains on disposal of financial assets. The average ROE and ROA thus reduced to 7.28% and 0.89% (Chart 3.50), respectively, reflecting declining profitability.

Average capital adequacy ratio rose

At the end of 2022, the average Tier 1 capital ratio and the average capital adequacy ratio of bills finance companies rose to 13.33% and 13.48%, respectively (Chart 3.51). Moreover, the capital adequacy ratio remained well above the statutory minimum of 8% for each company.

Chart 3.51 Average capital adequacy ratios of bills finance companies



Source: CBC.

3.3 Financial infrastructure

In 2022, Taiwan's payment and settlement systems operated smoothly and continued to develop. The FSC planned to implement appropriate monitoring of crypto assets in a gradual manner. Furthermore, in order to align with the government's policy of Taiwan's Pathway to Net-Zero Emissions in 2050, the Bank released the "CBC Strategic Plan to Address Climate Change Issues." Meanwhile, the FSC also continued an aggressive effort in implementing the green finance action plan with the aim of facilitating Taiwan's sustainable development, and continuously amended regulations to bolster the sound development of the financial sector.

3.3.1 Payment and settlement systems

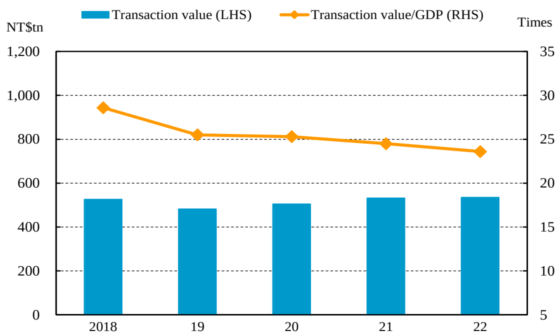
The transaction value of the CBC's CIFS and the IFIS, operated respectively by the Bank and the FISC, grew steadily and functioned smoothly. The FISC continued to strengthen the shared infrastructure for retail payments. Moreover, with an increase in the public's willingness to use non-cash payment instruments, consumer spending related to these instruments has also been expanding. Meanwhile, in light of recent risk events in the international crypto asset market, the FSC planned to take a step-by-step approach to enhance the protection of customer interests on domestic crypto asset platforms.

Overview of the CIFS's operation

The CIFS deals with large-value interbank funds transfers and provides the final settlement of interbank transfers. It is connected to each clearing system, such as those for domestic securities, bills, bonds and retail payments. In 2022, the amount of funds transferred via the CIFS was approximately NT$535 trillion, about 23.6 times the GDP for the year (Chart 3.52).

In terms of the retail payments, they are primarily processed by the IFIS, which utilizes the funds deposited by financial institutions in the Interbank Funds Transfer Guarantee Special Account (hereinafter the Guarantee Account) under the CIFS to clear and settle

Chart 3.52 Funds transferred via the CIFS



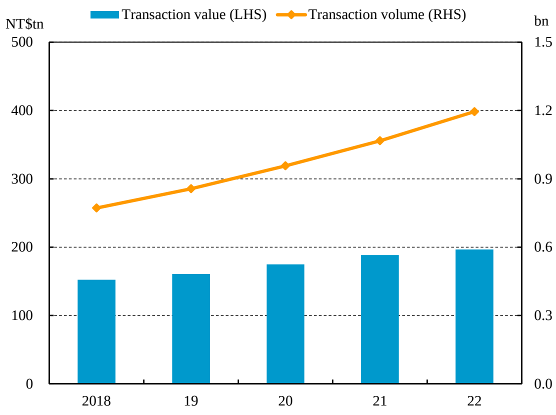
Note: Figure for GDP in 2023 is published by DGBAS on May 26, 2023.
Sources: CBC and DGBAS.

interbank payment transactions on a trade-by-trade basis.[56] In 2022, approximately 1.19 billion transactions were processed by the IFIS with the value totaling NT$197 trillion (Chart 3.53), increasing respectively by 12.00% and 4.32% compared to 2021.

Development of shared infrastructure for retail payments

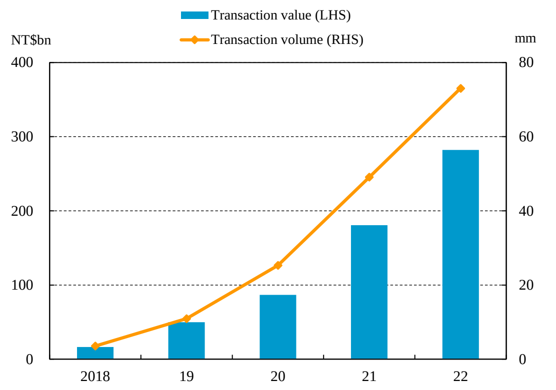
To enhance the convenience of using mobile payment for the public, the Bank continues to urge the FISC to establish a common QR Code payment standard. Since its launch in September 2017 till the end of 2022, a total of 37 participating institutions and over 250,000 affiliated merchants have joined this initiative. The accumulated volume of transactions processed through this common standard has exceeded 160 million with a total value of approximately NT$616.5 billion. The volume and value of transactions in 2022 increased by 48.79% and 56.11%, respectively, compared to the previous year (Chart 3.54).

Chart 3.53 Transaction value and volume processed by the IFIS



Source: CBC.

Chart 3.54 Transaction value and volume via QR code payment standard



Source: CBC.

Additionally, to facilitate the interconnection of information and cash flows between banks and e-payment institutions, the FISC established a shared platform for cross-institution e-payments in October 2021. This platform subsequently added various functions, such as e-payments for taxes and utility bills from 2022 onwards and is expected to provide a payment service for shopping in 2023 Q3.

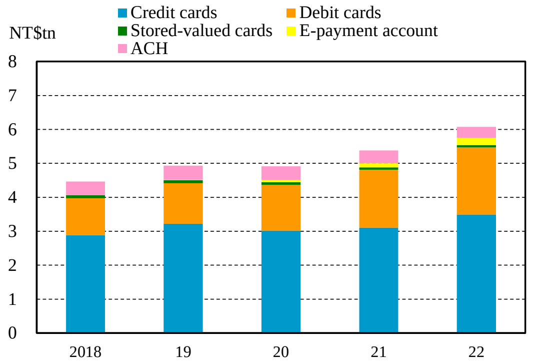
Domestic consumption via non-cash payment instruments

In 2022, the overall expenditure on non-cash payment instruments reached NT$6.08 trillion (Chart 3.55), an increase of 12.92% year on year. Among a variety of these payment instruments, the consumption amount via credit cards, debit cards, and e-payment accounts

[56] Interbank payment transactions include remittances, automated teller machine (ATM) withdrawals, transfers (including online and mobile transfers), tax payments and corporate funds transfers.

increased by NT$382.5 billion, NT$274.9 billion, and NT$86.5 billion, respectively. The growth could be attributed to the rising demand for contactless payments amid the pandemic and an improvement in convenience of e-payments.

Chart 3.55 Consumption via non-cash payment tools



Notes: 1. The consumption statistics of debit cards include consumer purchases with domestic chip bank cards, VISA and other international debit cards, UnionPay cards, and ATM transfers for shopping payments.
2. ACH inter-bank collection means that the payment institutions handle deduction and account entry through the ACH system of the TCH after obtaining the entrustment of the public.

Sources: CBC, FSC and FISC.

Development, risks, and international regulatory trends of the crypto asset market

In 2022, the crypto asset market remained highly volatile, triggered by multiple risk events such as the collapse of the stablecoin UST and the bankruptcy of the trading platform FTX. These developments caught the attention of international regulatory authorities. International institutions, including the Bank for International Settlements (BIS), have also advocated country-level regulation based on the principles of "same activity, same risk, same regulation." In this vein, the FSC also expressed its policy stance to implement appropriate monitoring of crypto assets in a gradual manner.

3.3.2 The Bank adopted policy measures in response to climate change

In recent years, extreme weather events attributable to climate change have led to substantial economic losses. As a result, the international community has been prompting nations to progressively adopt measures for transitioning towards a low-carbon economy. However, the transition process may pose operational challenges for industries, exert upward pressures on prices through green inflation, increase risks within the financial sector, and have an impact on financial stability. In this context, major central banks and financial supervisory agencies have been proactively evaluating the economic and financial impacts of climate change risks and progressively incorporated such risks into the realm of prudential supervision. They also carry out studies on the influence of climate change risks on the efficacy of monetary policies and corresponding countermeasures.

To align with the global development trajectory and support the government's 2050 net-zero transition plan, the Bank formulated the "CBC Strategic Plan to Address Climate Change Issues" and released it on December 30, 2022. The plan includes two policy objectives and three core strategies which are expected to be achieved through the gradual implementation of five categories of policy measures as follows: (1) to conduct research on the impact of climate change on monetary policies; (2) to utilize monetary policy operational tools to facilitate sustainable financial development; (3) to conduct research on macroprudential instruments to address climate change risks; (4) to incorporate green bonds into the foreign exchange reserve management consideration; and (5) to actively engage in international projects and collaboration pertaining to climate change risks.

Given that the economic and financial implications of climate change are highly uncertain and that international research in this field is still at an early stage, the Bank will conduct a rolling review to fine-tune the aforementioned measures. To understand the potential impacts of climate change risks on various aspects of the economy and the financial system, the Bank will draw insights from international organizations. Furthermore, the Bank has enhanced supervisory cooperation with the FSC on climate change issues to jointly facilitate Taiwan's sustainable development, mitigate the impact of climate change risks on the domestic economy, and bolster resilience of the financial system to climate change risks (Box 2).

Box 2
CBC Strategic Plan to Address Climate Change Issues

In recent years, extreme weather events resulting from climate change have become more frequent, which not only poses serious threats to life, property, and the ecosystem but also exerts a substantial impact on global economic output. Climate change risks could adversely affect the real economy and through the interconnections across economic and financial sectors amplify financial risks, and even build up systemic risks that threaten financial stability. In light of this, the Bank released the "CBC Strategic Plan to Address Climate Change Issues" on December 30, 2022. Based on the plan, the Bank will progressively implement a series of measures to maintain financial stability and foster sustainable economic development in Taiwan.

1. Definition and impact of climate change risks

1.1 Climate change might result in physical and transition risks

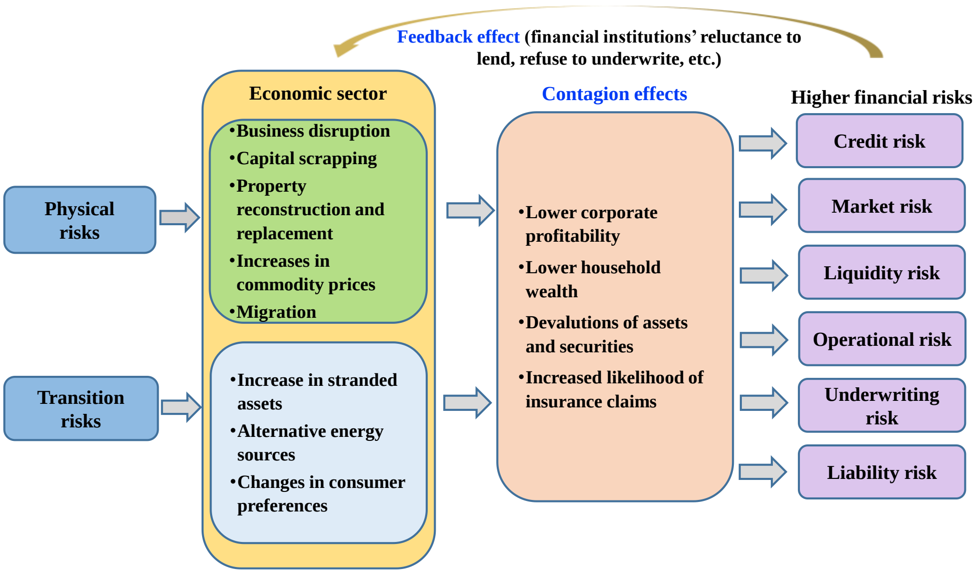
According to the Network for Greening the Financial System (NGFS),[1] climate change risks include physical risks and transition risks.

- **Physical risks** refer to the risks associated with acute impacts from extreme weather events (such as hurricanes and floods) and chronic impacts from global warming (such as increased average temperatures and sea levels), with such adverse implications as business disruption, capital impairment, property reconstruction or replacement, increases in commodity prices, and forced migration.
- **Transition risks** refer to the risks arising from the process of transition towards a low-carbon economy, including policy changes leading to the accumulation of stranded assets in specific industries, the impact of alternative energy sources resulting from advancements in energy technology, or changes in consumer preferences driven by households conforming to environmental protection policies.

1.2 Climate change risks amplify the contagion and feedback effects across the economic and financial sectors, posing a threat to financial stability

When the economic sector is exposed to physical risks and transition risks, it could heighten the risks of the financial sector through contagion effects. These risks encompass credit, market, and liquidity risks related to investments or financing positions, operational risks arising from business disruptions owing to disasters, and an increase in underwriting and liability risks owing to an upsurge in compensation claims or indemnity payouts. Consequently, the impacts could be transmitted from the economic sector to the financial

Chart B2.1 Contagion effects and feedback effects of climate risks



Sources: FSB (2020), NGFS (2019), NGFS (2020), and CBC.

sector. In turn, to prevent such risks from increasing, the financial sector might take a series of countermeasures against the shocks, which would generate feedback effects through channels such as capital markets, business adjustments, and cross-border contagion effects, thereby amplifying the impact on the economic sector (Chart B2.1).[2]

2. Policies and measures adopted by the Bank in response to climate change

Being a responsible member of the global community, the Taiwanese government announced the *Taiwan Sustainable Development Goals (T-SDGs)* in December 2018, and has actively engaged in sustainable development initiatives. In April 2021, the government declared its commitment to achieving net-zero transition in 2050. Subsequently, in March 2022, it unveiled the comprehensive action plans and measures covering the *12 Key Strategies*[3] to fulfill the long-term net-zero transition goal.

Although the Bank is not the primary driver of the climate change-related actions in Taiwan, it recognizes the importance of aligning itself with the international trend and supporting the government's 2050 net-zero transition plan. The Bank thus formulated two policy objectives and three core strategies after drawing on the experiences and practices of major international central banks and developed a policy framework for the Bank's response actions to address climate change challenges (Chart B2.2). To achieve its policy objectives, the Bank will progressively implement the following measures across five key aspects, namely monetary policy, monetary policy tools, macroprudential surveillance, foreign exchange reserve management, and international engagement and collaboration.

Chart B2.2 The Bank's policy framework in response to climate change

Policy objectives

- Strengthen the resilience of the economic and financial system in response to climate risks
- Facilitate the smooth transition of the economic system towards a sustainable green economy

Core strategies

- Support the establishment of a green and sustainable investment and financing environment
- Proactively enhance the Bank's expertise and capabilities to address climate-related issues
- Incorporate climate risk considerations into the Bank's operation and management of foreign exchange reserves

Policy measures

Monetary policy	Monetary policy operating tools	Macroprudential surveillance	FX reserve management	International collaborations
Conduct research on the impact of climate change upon monetary policies	Utilize monetary policy operational tools to facilitate the development of sustainable finance	Conduct research on macroprudential instruments to address climate change risks	Incorporate green bonds into the FX reserve portfolio	Actively engage in international collaborations pertaining to climate change risks

Source: CBC.

2.1 Conducting research on the impact of climate change upon monetary policy

The Bank is deliberating on how to incorporate weather factors into its price forecasting model and plans to collect climate change-related data to compile climate indicators. In the medium term, the Bank will explore the development of industry-specific models and multi-sector models, combined with the results from macro-econometric model analysis, to investigate the impacts of changes in energy or food prices under various scenarios, seeking a deeper understanding of the implications of climate change risks on the economy and the financial system.

2.2 Utilizing monetary policy operational tools to facilitate the development of sustainable finance

The Bank is mulling over the adoption of domestic banks' performances of implementing green/sustainable finance as a component of the Bank's reference indictors when conducting open market operations and accepting redeposits from domestic banks. In addition, the Bank plans to include sustainability debentures issued by banks in its annual small-scale test repo operation targets, in order to encourage banks to increase the issuance of such instruments and enhance investors' willingness to hold them.

2.3 Conducting research on macroprudential instruments to address climate change risks

The Bank stays updated with the latest international advancements in climate risk assessment data and methodologies and studies the experiences of major central banks in assessing climate change-related risks and in developing prudential instruments. Going forward, the Bank will collaborate with experts and scholars to conduct research, aiming to enhance expertise in developing in-house climate risk-related models. This will serve as a basis for planning climate risk-related macro-stress testing and for evaluating viable options of macroprudential instruments.

2.4 Incorporating green bonds into the FX reserve portfolio

Under the principles of safety, liquidity, and profitability, the Bank will incorporate green bonds into its consideration of foreign exchange reserve portfolio management. On the premise that bond issuers meet the Bank's credit rating requirements, the Bank will continuously invest in green bonds that meet international standards and are issued by foreign governments or international financial organizations. Moreover, the Bank will gather and analyze information related to the implementation of sustainable development goals by stakeholders directly involved in foreign exchange reserve portfolio management, thereby contributing to the development of the international green finance market.

2.5 Actively engaging in international cooperation and collaboration pertaining to climate change risks

Sustainable development has become a key focus in financial policies of various countries. The Bank continues to participate in climate change risk- and green finance-related seminars, and establish interactive channels such as bilateral video conference mechanisms with major central banks and international organizations. These initiatives have facilitated exchanges on the best practices in response to climate change risks and sharing of relevant experiences among central banks.

3. Conclusion

Although the Bank is not the primary driver of climate change-related actions in Taiwan, it will proactively monitor the evolution and developments of climate-related issues. Given that the impact of climate change on the economy and the financial system is highly uncertain and migrates greatly over time, and that international research in this field is just emerging, the Bank will draw insights from international organizations and continuously review and adjust the aforementioned measures. In addition, the Bank has strengthened collaborative efforts with the FSC on climate change issues, aiming to collectively mitigate the impact of climate change risks on Taiwan's economy and enhance the financial system's resilience to climate change risks, so as to ensure the sound development of

Taiwan's financial sector and sustainable economic growth.

Notes: 1. NGFS (2020), "Climate Change and Monetary Policy Initial Takeaways," June; NGFS (2021), "NGFS Climate Scenarios for Central Banks and Supervisors," June.

2. FSB (2020), "The Implications of Climate Change for Financial Stability," November; NGFS (2019), "A call for Action, Climate Change as a Source of Financial Risk," April; NGFS (2020), "Climate Change and Monetary Policy Initial Takeaways," June.

3. Including wind/solar photovoltaics, hydrogen, innovative energy, power systems and energy storage, energy saving and efficiency, carbon capture utilization and storage, carbon-free and electric vehicles, resource recycling and zero waste, carbon sinks, green lifestyle, green finance and just transition.

3.3.3 The FSC continues to take measures related to green finance

In order to coordinate financial resources to support net-zero transition in Taiwan and continuously enhance the management of climate risk for the financial industry, the FSC has successively implemented important measures since 2022 as follows:

Launching "Green Finance Action Plan 3.0"

The FSC launched the Green Finance Action Plan 3.0 (hereinafter referred to as the Plan) in September 2022. The vision of the Plan will be achieved through the efforts in five aspects,[57] namely "deployment, funding, data, empowerment, and ecosystem," and via 26 measures. The Plan is expected to encourage financial institutions to: (1) identify GHG emissions of their own operations and of their investments and financing positions; (2) assess climate-related risks and opportunities; and (3) set goals and strategies to reduce their GHG emissions. Financial institutions could in turn drive corporate efforts towards low-carbon transition and enhance the disclosure of information related to environmental, social, and governance (ESG) performance.

Strengthening financial institutions' management of climate-related risks and disclosure of GHG emission information

To assess the impact of climate change risks on the banking industry, the FSC commissioned the Bankers Association of the Republic of China to draw up the "Plan for Climate Change Scenario Analysis of Domestic Banks." The climate change scenarios, based on the scenarios designed by the NGFS, are used to assess the impact of climate change risks on the credit risk positions of domestic banks and evaluate their ability to withstand climate-related risks. Moreover, in order to enhance the disclosure of GHG emission information of the financial industry, the FSC's compulsory disclosure of scope 1 and scope 2 inventory and verification by financial institutions[58] will be phased in gradually from 2024 onwards based on the size of their capital or asset management business.

[57] The five major aspects include: (1) Deployment: to require compulsory disclosure of information about GHG emissions by financial institutions and set strategies and objectives, so as to drive companies to reduce their GHG emissions; (2) Funding: to promote the adoption of Taiwan Sustainable Taxonomy and to channel funds into promoting sustainable development; (3) Data: to integrate information from different institutions and to build an ESG data platform; (4) Empowerment: to enhance the professional competencies of sustainable finance for financial institutions' employees through training programs and certification; (5) Ecosystem: to foster cooperation among financial institutions and to conduct the evaluation of sustainable finance.

[58] Financial institutions comprise banking enterprises, insurance firms, financial holding companies, bills finance companies, securities firms, futures commission merchants, and securities investment trust enterprises.

Formulating the "Taiwan Sustainable Taxonomy"

The FSC, the Environmental Protection Administration (EPA), the Ministry of Economic Affairs (MOEA), the Ministry of Transportation and Communications (MOTC), and the Ministry of the Interior (MOI) jointly issued the "Taiwan Sustainable Taxonomy" (the Taxonomy) in December 2022, as a reference guide[59] for corporates to determine whether their economic activities are in conformity with sustainable finance. The Taxonomy offers, as a start, guidance for the top three industries in terms of the amount of investment and financing by domestic financial institutions, which are manufacturing, building and construction, and transportation and storage, so as to help them identify whether their economic activities, namely 16 ordinary economic activities and 13 forward-looking economic activities, qualify as sustainable.

Establishing the "Financial Industry Net-Zero Working Platform"

The FSC and the Taiwan Financial Services Roundtable jointly established the "Financial Industry Net-Zero Working Platform" with five workstreams in December 2022. The platform has invited 16 peripheral institutions and financial industry associations to become members to develop relevant tools, guidelines and plans in a collective effort while serving as a space in which financial institutions can cooperate, collaborate, and exchange ideas.

3.3.4 Reclassifying financial assets by some insurers

Form March 2022 onwards, rapid interest rate hikes of major central banks led to a sharp decline in profits or net worth of insurance companies in Taiwan. The reason is that insurance companies applied different accounting treatment principles to the valuation bases for assets and liabilities. While their financial assets are measured at fair value in accordance with International Financial Reporting Standard (IFRS) 9, their liabilities are still recognized on a lock-in basis as Taiwan has not yet adopted the IFRS 17 *Insurance Contracts*, and thus have not yet been valued at current market rates. As a result, when market interest rates rise sharply, the asset side reflects huge unrealized evaluation losses, while the liability side cannot reflect the gains correspondingly.

To mitigate the impact of large fluctuations in interest rates on their balance sheets, some

[59] The Taxonomy is to provide one of five judgments (aligned; working on it; improving; not aligned; and not eligible) regarding the degree of sustainability of the primary economic activities in terms of certain conditions such as "substantial contribution to climate change mitigation," "shall not significantly harm five other environmental goals," "shall not significantly harm social safeguards," and whether they have adopted any concrete improvement or transition plans.

insurance companies planned to change their business models for managing financial assets to address the challenges resulting from changes in the external environment to their operations. Moreover, in October 2022, Taiwan's Accounting Research and Development Foundation also provided reference guidelines to address the issues and questions about the reclassification of financial assets as drastic changes in the international economic situation ushered in different business models in managing financial assets. As of the end of March 2023, nine life insurance companies have reclassified their financial assets.

In addition, in order to maintain capital soundness of the insurance industry, the FSC required those insurers who had reclassified financial assets to set aside a provision for special reserves. Furthermore, for net worth increases after reclassification, the FSC required that special reserves should be set aside by insurers' parent financial holding companies to reflect the full amount of the increases and by the public companies with equity method investments in life insurers based on their shareholding ratio, so as to prevent the reclassification from leading to increased distribution of dividends.

3.3.5 Establishing the financial vulnerability index of Taiwan

In the wake of the 1997 Asian financial crisis, central banks and regulatory authorities have been devoted to developing indicators for measuring financial stability or vulnerability, with the intention of reflecting the current financial condition, or even predicting crises. For instance, the International Monetary Fund (IMF) has been collaborating with various economies since 1999 to promote the compilation of financial soundness indicators (FSIs), so that central banks and regulatory authorities are able to enhance surveillance of relevant financial systems through more comprehensive information on financial and real sectors. In accordance with international standards, the Bank also consulted the IMF compilation guide on FSIs and began to regularly publish the Taiwan FSIs in 2008.

Despite the fact that FSIs can be employed to monitor changes in financial soundness across various sectors on a regular basis, the trends of different financial indices may sometimes take divergent paths, making it difficult to grasp the full picture of the financial landscape. Therefore, in 2018, the Bank conducted a pilot study to develop the TFVI based on the FSIs by referring to the methodologies used in past research and literature. Subsequently, in view of a major revision of the FSIs framework by the IMF in 2019, along with the fact that the aforementioned TFVI still needs improvement on the correlation among variables and on the warning thresholds, the Bank therefore worked with domestic academics[60] to utilize the hierarchical

[60] See Hsu, Shih-Hsun (2023) "Taiwan Financial Vulnerability Index," commissioned research report by the Bank, February.

common factor model to develop the TFVI in a more comprehensive manner for the index to better reflect the vulnerability dynamics of the Taiwanese financial system (Box 3).

With the abovementioned effort, the TFVI is able to offer a broad picture of the current financial system's vulnerabilities, and its trend is correlated, to some extent, with material financial distress episodes over the past years in Taiwan. Moreover, the lead-lag relationship between the TFVI and the credit-to-GDP gap is statistically significant, indicating that the TFVI aggregated by extracted information from multiple sectors does possess a certain degree of early warning capability. In the future, subsequent to trial calculations, the TFVI can serve as a reference for the Bank to monitor the vulnerability of the financial system.

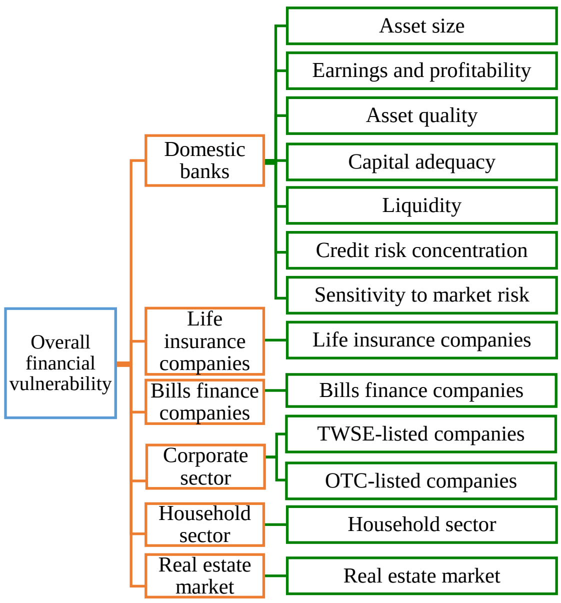
Box 3
Establishing the Financial Vulnerability Index of Taiwan

From 2008 onwards, the Bank has compiled and published Taiwan's FSIs after taking reference from the FSI compilation guidelines published by the IMF.[1] These indicators, regularly disclosed in the *Financial Stability Report* and on the Bank's website, are used to monitor changes in individual sectors as well as financial markets. However, given that the FSIs currently comprise as many as 58 indicators and cover multiple sectors, it is not meant to promptly gauge the overall stability or vulnerability of the financial system. Against this backdrop, in collaboration with domestic academics,[2] the Bank endeavored to establish the Taiwan Financial Vulnerability Index (TFVI) based on the existing framework of the FSIs. The TFVI aims to provide a comprehensive measurement of financial system vulnerabilities, which helps the Bank to identify the source of vulnerabilities and take response measures in a timely manner. In this Box, we would like to briefly introduce the methodology applied to establish the TFVI, and the interpretation of the preliminary research results.

1. Compilation methodology for the TFVI

The TFVI, built on the basis of the FSIs compiled by the Bank, is divided into six sectors, including domestic banks, life insurance companies, bills finance companies, non-financial corporate sector, household sector and real estate market. The banking sector is further classified into seven subsectors, while the corporate sector is split into two (Chart B3.1). Finally, each sector or subsector consists of a different number of indicators.[3] The methodology for compiling the TFVI is as follows:

Chart B3.1 The structure of the TFVI



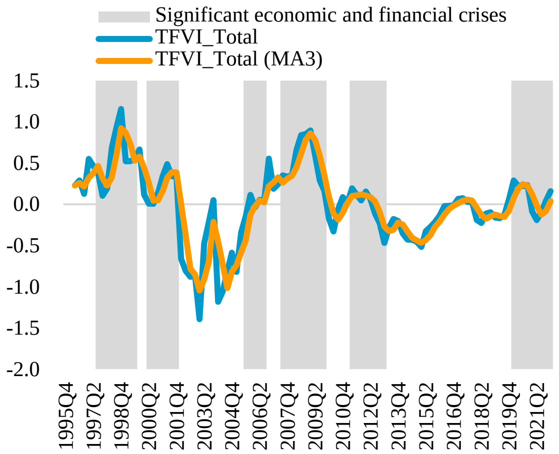
Note: For more details about the indicators, please refer to the "Appendix: Financial soundness indicators," in the *Financial Stability Report*, May 2023.
Source: CBC.

(1) After computing the differences of the FSIs, we employ sequential principal component analysis to estimate a hierarchical common factor model. This methodology allows us to decompose the trend and variance of each FSI

into two parts - one affected by multilevel common factors and the other capturing the variable-specific variation.

(2) Via a linear regression analysis of the FSIs treated as explained variables, together with the previous period's value of the hierarchical common factors constructed in the above step as explanatory variables, we obtain the residuals corresponding to each FSI.[4] The residuals, representing uncertain information that cannot be captured by previous hierarchical common factors, serve as the basis for establishing the vulnerability index.

Chart B3.2 The movement of the TFVI



Notes: 1. TFVI_Total is the original FVI, and TFVI_Total (MA3) is the moving average of the TFVI from time t to t - 3.
2. For more detailed information about significant economic and financial crises, please see Note 7.
Source: CBC.

(3) After adjusting the signs of the corresponding residuals in respect of the correlation between each FSI and financial vulnerability,[5] we aggregate the weighted residuals in every subsector so as to acquire the respective financial vulnerability index. The weighted subsectoral indices are then summed up to create sectoral indices. Lastly, the overall financial vulnerability index can be calculated by combining the six sectoral indices.[6]

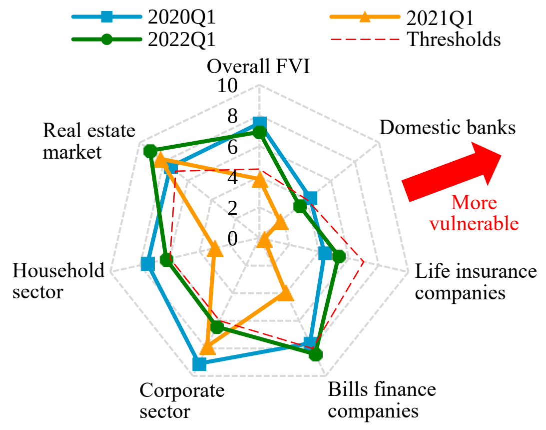
2. Preliminary TFVI research results

2.1 The movement of the TFVI and its association with financial crises

In order to assess whether the TFVI is capable of accurately reflecting changes in the vulnerability of Taiwan's financial system, this study defines eight material economic and financial events domestically and globally since 1995 Q4,[7] and explores their relationship with the TFVI. As shown in Chart B3.2, the TFVI shows a trend highly correlated to the aforementioned events. Furthermore, with regard to the smoothed TFVI,[8] points in time where the index exceeded 1.65 times standard deviation coincide with the periods of domestic financial distress (from 1998 Q4 to 1999 Q3) and the global financial crisis (from 2008 Q4 to 2009 Q2). These results exhibit that the TFVI compiled in this study should have the ability to identify notable changes in domestic and international financial conditions.

2.2 Visualization analysis of the TFVI

Chart B3.3 The radar chart of the TFVI



Source: CBC.

Apart from the overall TFVI, this study further adopts visualization analysis to present the variations in vulnerability for each sector. The main approach involves specifying optimal thresholds by applying the Youden index. Subsequently, we transform these threshold values and subsectoral indices into a scale ranging from 0 to 10. These figures are depicted on a radar chart, aiming to compare the extent of adverse impacts across different sectors. Taking the period of the COVID-19 crisis for example, the subsectoral indices for the household sector, corporate sector and real estate market were more significantly affected by the pandemic than the others (see Chart B3.3). The result suggests that the COVID-19 pandemic had a more profound impact on household income and corporate profits, thereby disturbing the supply-demand balance in the real estate market. By contrast, domestic banks and life insurance companies have generally maintained TFVI levels well below the threshold values over the past three years, showing relatively less vulnerability.

3. Conclusion

This study uses the FSIs compiled by the Bank to construct the TFVI. A hierarchical common factor model is introduced to filter the co-movement and common trends between variables and to subsequently build the TFVI for each sector and total TFVI from the bottom up. In sum, the TFVI is able to broadly reflect changes in Taiwan's financial vulnerability and possesses an early warning capacity. Thus, it can be a vital supplementary tool for the Bank to monitor the financial stability landscape.

Notes: 1. For more details about the FSIs of the Bank, please see the "Appendix: Financial soundness indicators" in the *Financial Stability Report*, May 2023.

2. See Hsu, Shih-Hsun (2023), "Taiwan Financial Vulnerability Index," commissioned research report by the Bank, February.

3. The construction of the TFVI utilized a total of 63 FSIs, including the current 58 indicators and the other five indicators removed according to the 2019 IMF compilation guide (i.e., household loans to total loans, corporate loans to total loans, large exposure to capital, gross asset positions in financial derivatives to capital, and gross liability positions in financial derivatives to capital).

4. Baker, Scott R., Nicolas Bloom, and Steven J. Davis (2016), "Measuring economic policy

uncertainty," *Quarterly Journal of Economics*, March.

5. Positive/negative values represent an increase/decrease in financial vulnerability caused by movement of the indices. For example, a higher return on assets (ROA) of financial institutions indicates better profitability and lower financial vulnerability. Therefore, ROA and financial vulnerability tend to move in opposite directions, and a negative sign should be applied when aggregating its residuals for subsector indices.
6. All indices are aggregated using equally-weighted averages owing to various starting points for each FSI, and only indices available at specific points in time are summed up when calculating the corresponding vulnerability index. Furthermore, under the current methodology for compiling financial soundness indicators, only domestic banks and the corporate sector have subsectoral indices.
7. The eight material economic and financial events refer to the Asian financial crisis (from 1997 Q3 to 1998 Q3), the domestic financial crisis (from 1998 Q4 to 1999 Q3), the bursting of the dot-com bubble (from 2000 Q2 to 2001 Q4), the credit card crisis in Taiwan (from 2005 Q3 to 2006 Q3), the subprime mortgage crisis (from 2007 Q3 to 2008 Q2), the global financial crisis (from 2008 Q3 to 2009 Q4), the European sovereign debt crisis (from 2011 Q2 to 2013 Q1), and the COVID-19 pandemic (from 2020 Q1 onwards).
8. TFVI_Total (MA3) refers to the moving average of the TFVI over the past three quarters.

3.3.6 FX regulation amendments

To enhance the effectiveness of anti-money laundering and counter-terrorism financing, strengthen the administration of foreign currency exchange counter (FCEC), match up with the amendment of the *Civil Code* lowering the age of majority for natural persons, provide clear guidance regarding FX settlement declarations for legal entities such as companies and limited partnerships, and to streamline relevant administrative processes, the Bank continued to amend FX regulations in 2022 as follows:

- The Bank revised the *Directions Governing Banking Enterprises for Operating Foreign Exchange Business* and the *Regulations Governing the Establishment and Administration of Foreign Currency Exchange Counters* in January 2022. The main amendments of the latter included: (1) lowering the cap on each foreign currency exchange transaction for each customer handled by a FCEC from US$10,000 to US$3,000 (or its foreign currency equivalent); (2) adding the provision that an FCEC should keep documents related to enhanced due diligence, suspicious transactions, and designated sanctions and should promptly provide the documents required to be kept under the *Regulations* while being inspected; (3) amending the stipulations regarding the situations under which the Bank of Taiwan may revoke or cancel the approval of an FCEC, and adding that it may notify an FCEC to take remedial actions within a specific period of time in view of the circumstances when an FCEC violates relevant regulations; and (4) adding the provision requiring the implementation of enhanced customer due diligence by an FCEC.

- The Bank revised the *Regulations Governing the Declaration of Foreign Exchange Receipts and Disbursements or Transactions* and relevant regulations in December 2022. The main amendments included: (1) amending the stipulations governing the age of natural persons in the competent laws and regulations, and revising the provisions for the declaration of FX settlement for “companies” and “limited partnership”; (2) relaxing the restrictions on the declaration of FX settlement for equity investment by overseas Chinese and foreign nationals and for direct investment in Taiwan by people from Mainland China Area; and (3) stipulating that the declaration of FX settlement involving outward/inward remittances of the allocated disbursements for terminating the issuance of Global Depositary Receipts (GDRs), American Depositary Receipts (ADRs), and Taiwan Depositary Receipts (TDRs) can be processed directly by banks after verifying and confirming relevant documentations that evidence the FX disbursements, instead of applying to the Bank for an approval.

3.4 General assessment of Taiwan's financial system

From 2022 onwards, various factors such as the eruption of Russia-Ukraine war, the accelerated rate hikes and balance sheet tapering by the Fed, the zero-COVID policy in China, and the banking crises in the US and Europe have caused significant turbulence in global financial markets. Nonetheless, the impact on Taiwan's financial system has been relatively moderate.

In Taiwan's financial markets, the outstanding amount of bill issuance edged down, while the outstanding amount of bond issuance reached a historical high. The secondary markets for bonds and bills remained relatively stable. As for equity markets, stock indices rebounded after falling from record highs and volatility gradually decreased. Additionally, Taiwan's stock markets continued to enjoy brisk trading and were not significantly affected by the banking turmoil in the US and Europe. Meanwhile, the foreign exchange market saw a rise in trading volumes and the NT dollar exchange rate remained relatively stable.

Regarding financial institutions, domestic banks' asset quality improved and their profitability reached a near 20-year high with adequate capital levels. However, against the backdrop of a more conservative real estate market and rising interest rates on bank loans, the impact of real estate market changes on banks' credit quality warrants close attention. Meanwhile, insurance companies' profitability slumped but their average capital adequacy ratio rebounded after a sharp drop, coupled with higher market risk of foreign investment positions. The guarantee business of bills finance companies contracted and their profitability declined, along with still-high liquidity risk and interest rate risk.

Domestically, payment and settlement systems operated smoothly and the shared infrastructure for retail payments was further enhanced. The Bank constructed the Taiwan Financial Vulnerability Index to actively monitor for vulnerabilities of the financial system. In addition, the Bank collaborated with the FSC to address climate change issues so as to mitigate their impact on the financial system.

Overall, financial markets in Taiwan kept functioning smoothly. Among financial institutions, banks and bills finance companies still operated soundly. Meanwhile, the insurance companies were confronted by greater adverse impacts, but they increased capital and took other measures to counter the challenges. Additionally, domestic systemically important payment systems functioned in an orderly manner. In general, Taiwan's financial system remained largely stable. Nevertheless, some direct and indirect effects on the financial markets and financial institutions, which could arise from factors such as a slowdown in global economic growth, interest rate hikes by major central banks, spillover effects from the banking crises in the US and Europe, and geopolitical risks, deserve closer attention.

IV. Measures to promote financial stability

4.1 Measures taken by the Bank and the FSC to promote financial stability

4.1.1 Measures taken by the Bank to promote financial stability

From 2022 onwards, the Bank raised the policy rates five times and the reserve requirement ratios on NTD deposits twice for the sake of curbing elevated domestic inflation that could drive up inflation expectations. At the same time, in order to preclude excessive flows of bank credit into the real estate market and stem resultant distortions in credit resources, the Bank continued to implement targeted macroprudential measures. The Bank also continued to adopt flexible FX rate policies to maintain dynamic stability of the NT dollar exchange rate, so as to ensure sound development of the domestic financial system and sustainable growth of the whole economy.

The Bank raised the policy rates and conducted open market operations

Global inflation has mounted in recent years. Although Taiwan's CPI inflation and core CPI inflation rates were relatively lower than those of countries in Europe and the US, the still-elevated domestic inflation might lead to higher inflation expectations. Hence, since March 2022, the Bank has adopted a moderate approach to monetary tightening by raising the policy rates five times by a total of 0.75 percentage points[61] and increased the reserve requirement ratios on NTD deposits twice by a total of 0.5 percentage points.[62] The policy moves were viewed as conducive to restraining domestic inflation expectations, maintaining price stability and fostering sustainable economic development.

Furthermore, based on its assessment of international and domestic economic and financial conditions, the Bank conducted open market operations and managed reserve money at an appropriate level by issuing NCDs. At the end of 2022, the total outstanding amount of NCDs issued by the Bank was NT$8,601 billion, while the average annual growth rate of reserve

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[61] The Bank raised the discount rate, the rate on refinancing of secured loans, and the rate on temporary accommodations by 0.25 pps each on March 18, 2022. Afterwards, the policy rates were adjusted upward by 0.125 pps in each of the subsequent Board Meetings on June 17, 2022, September 23, 2022, December 16, 2022, and March 24, 2023, reaching 1.875%, 2.25%, and 4.125%, respectively.

[62] The Bank twice raised the reserve requirement ratios on NTD deposits by 0.25 pps on July 1, 2022 and October 1, 2022, respectively.

money registered 8.91% for the year. In addition, the weighted average overnight call loan rate trended upwards along with the Bank's policy rate hikes, rising from 0.083% in December 2021 to 0.507% in December 2022 and further increasing to 0.598% in March 2023.

The Bank continued to adopt targeted macroprudential measures and related actions to strengthen policy effectiveness

To prevent excessive credit resources from gushing into the real estate market and to enhance banks' risk management of real estate lending, with the aim of promoting sound banking operations and fostering financial stability, the Bank adjusted targeted macroprudential measures four times in December 2020 and March, September, and December 2021.[63] Furthermore, the Bank continued to adopt supporting measures associated with the announced selective credit controls and conducted monetary tightening in a gradual manner, which were judged to help strengthen the effectiveness of real estate credit control measures.

Since 2022, the annual growth rate of real estate-secured credit granted by domestic banks has slowed down, with the credit concentration in real estate lending slightly declining and the NPL ratio of real estate credit remaining at a low level. In the future, the Bank will fine-tune the regulatory measures as needed, depending on the status of real estate credit risk management of financial institutions, the effectiveness of targeted macroprudential measures, and developments in the housing market, so as to promote sound banking business and foster financial stability.

Adopting a flexible FX rate policy to maintain the dynamic stability of the NT dollar exchange rate

As Taiwan is a small open economy that is highly interconnected through trade with other economies, the Bank suitably adopts a managed float exchange rate regime to contain sharp fluctuations in exchange rates. The exchange rate of the NT dollar is in principle determined by market forces. Nevertheless, when disorderly movements (such as massive inflows or outflows of short-term capital) or seasonal factors lead to excess volatility and disorderly movements in the NT dollar exchange rate with adverse implications for domestic economic and financial stability, the Bank will, in line with its mandate, aptly maintain FX market order.

In recent years, huge and frequent movements of international short-term capital flows have superseded international trade and macroeconomic fundamentals and become the key factor

[63] See the Bank's 2022 *Financial Stability Report*.

influencing the volatility of exchange rates. With a view to preventing the abovementioned factors from disrupting the domestic FX market, the Bank conducts “leaning against the wind” operations to maintain order in the FX market when necessary so as to mitigate volatile movements of the NT dollar exchange rate and foster FX market efficiency. The dynamic stability of the NT dollar exchange rate is conducive to the long-term sound development of the domestic economy as a whole.

In addition, the Bank continued to undertake appropriate management measures to safeguard FX market order and promote its sound development. These measures mainly included: (1) monitoring up-to-date transaction information in the FX market through the Real-Time Reporting System for Large-Amount FX Transactions; (2) reinforcing off-site monitoring efforts to ensure that forward transactions are based on genuine needs so as to curb FX speculation; (3) urging authorized FX banks to enhance their exchange rate risk management, thereby reducing FX exposures of individual banks and systemic risks in the FX market; and (4) strengthening targeted examinations on FX businesses in order to maintain the discipline of the FX market.

4.1.2 Measures undertaken by the FSC to maintain financial stability

From 2022 onwards, the FSC amended regulations to assist the insurance industry in coping with the impact of surging claims on pandemic insurance policies and from the Fed’s fast interest rate hikes. The FSC also implemented measures to stabilize equity markets in response to sharper fluctuations. In the meantime, the FSC continued to strengthen corporate governance, information security, and other supervisory measures in the financial industry to preserve financial stability.

Strengthening risk bearing capacity of the insurance industry

The insurance industry suffered repercussions owing to surging claims on COVID-related policies and the impact of the Fed’s rapid interest rate increases on their net worth. To help insurers counter these issues and enhance their risk-bearing capacity, the FSC amended the foreign exchange reserve requirements of the life insurance industry and broadened the scope of bonds and notes in the conditional trades insurers are allowed to engage in. In addition, the FSC also took other measures as follows:

(1) In order to ensure that insurers make a concerted effort to handle matters affecting the rights and interests of insurance policyholders and to facilitate a steady benchmarking with the

international Insurance Capital Standard (ICS), the FSC announced in September 2022 that it would provide enterprises with the following assistance measures. In calculating the risk-based capital (RBC) ratio, regulations were relaxed for "deferred income tax assets" from an approach of year-by-year recognition as RBC assets to being recognized in full as regulatory capital. Additionally, in October 2022, the FSC announced that the implementation of the original plan for insurers to take risk-based capital charges associated with terrorist attacks, communicable diseases, and credit guarantees in addition to catastrophe risks by the end of 2022 will be postponed to the end of 2024.

(2) To facilitate smooth adoption of the ICS by insurers and to strengthen the regulatory capital quality of the insurance industry, the FSC proposed the amendment of the *Regulations Governing Capital Adequacy of Insurance Companies* in April 2023, which would adopt a layered structure for regulatory capital to be divided into Tier 1 Unlimited Capital, Tier 1 Limited Capital and Tier 2 Capital based on insurers' loss-absorbing capacity and sustainability. Real estate value-added benefits would be included in Tier 2 Capital.

(3) To enhance fundraising flexibility for insurers, the FSC amended the *Directions Governing the Issuance of Corporate Bonds as Capital Instruments by Insurance Companies* on April 14, 2023. This amendment relaxes the restriction and allows insurers to issue long-term corporate bonds with maturities of 10 years or more, which shall be included in Tier 2 Capital.

Taking measures for stock market stability to address market fluctuations

Volatility of domestic stock markets surged sharply in the second half of 2022 as a result of international political and economic uncertainties. In order to maintain orderly stock markets and safeguard investor interests, the FSC expanded the range of eligible collateral for margin calls in July 2022 and imposed restrictions on the short selling of securities in October 2022. Afterwards, with global stock markets stabilizing, the FSC removed the aforementioned restrictions in February 2023 and resumed normal market administration.

Continuing to enhance corporate governance of financial industry entities

To strengthen corporate governance of financial holding companies and the securities and futures industry, the FSC made a regulatory amendment in 2022 stipulating that directors, supervisors, general managers, or related persons, of a financial holding company who act concurrently as the director, supervisor, or general manager of other financial institutions would be deemed to have a conflict of interest. In addition, the FSC announced in April 2023 that it would study and amend the *Financial Holding Company Act* and the *Banking Act of the Republic of China* to strengthen requirements regarding the transparency and management of equity and added supervisory measures prohibiting shareholders who have control over financial holding companies or banks but do not hold the positions of responsible persons from improperly interfering in the operations of financial institutions.

Launching Financial Cyber Security Action Plan 2.0 to continuously reinforce financial information security

To ensure uninterrupted operation of the financial system, the FSC in December 2022 released the "Financial Cyber Security Action Plan 2.0" in the wake of the "Financial Cyber Security Action Plan 1.0" in 2020. The key points for implementation are as follows: (1) requiring a wider range of institutions to appoint a chief information security officer (CISO) and to institute periodic CISO liaison meetings; (2) adopting and amending self-discipline rules in response to digital transformation and the opening of online services; (3) increasing the adoption of international cyber security management standards and establishing cyber security monitoring mechanisms.

Facilitating the safe and sound operations of offshore funds and electronic payment institutions

(1) To protect the interests of investors and conduct sound management of offshore funds, the FSC amended the *Regulations Governing Offshore Funds* in December 2022. The main amendments included: (A) a master agent which handles the offering and selling of offshore funds in Taiwan shall not represent more than five offshore fund institutions; (B) a master agent that handles four or more offshore fund institutions shall post an additional operating bond; (C) considering how legislations in the jurisdiction where an offshore fund is registered may differ from those in Taiwan, the FSC has eased qualification criteria for acting as a master agent or sub-distributor of an offshore fund.

(2) The amendments to the *Act Governing Electronic Payment Institutions* were passed in January 2023, providing the FSC with greater flexibility in discretionary power. Given the safe and sound operation of an electronic payment institution could be hindered by that institution's violations of legislation or its articles of incorporation, or by other behaviors of the institution, the FSC may require an electronic payment institution to set aside a certain amount in reserves or to increase capital to strengthen operational soundness of electronic payment institutions.

4.2 The Bank will continue to adopt measures to promote financial stability when necessary

In 2022, despite major central banks' simultaneous tightening of monetary policies to combat high inflation and the resultant global economic slowdown, Taiwan's financial markets continued to function well. Among financial institutions, the operations of the banking sector and bills finance companies remained steady. While the insurance industry faced somewhat bigger headwinds, capital increases and other countermeasures were taken to address the adverse impacts. Additionally, domestic systemically important payment systems operated smoothly. As a whole, Taiwan's financial system remained largely stable. The Bank continued to adopt appropriate monetary, credit and foreign exchange policies in response to changes in the global and domestic economic and financial conditions to promote financial stability. Meanwhile, the FSC revamped relevant financial regulations and enhanced financial supervisory measures to facilitate sound operations of financial institutions and maintain financial stability.

Since entering the year 2023, the global economic and trade growth momentum has decelerated amid the spillover effects of major central banks' monetary tightening, while inflation has somewhat cooled but remained elevated. Moreover, the recent bank failures in the United States and Europe have resulted in severe market turbulence, which has compounded the uncertainties over global economic prospects. Looking ahead, the reopening of the Chinese economy and the ongoing Russia-Ukraine conflict may exert upward pressure on commodity prices, hindering the progress of disinflation in major economies. Furthermore, the escalating US-China technology dispute poses a potential risk to the recovery of the Chinese economy. Moreover, factors such as the US and European monetary tightening and their spillover effects, growing uncertainty in commodity supplies resulting from climate change, and escalating geopolitical risks could cause global inflationary pressures to linger, intensify financial market volatility, and heighten downside risks to the global economy.

Considering that the international economic outlook is still surrounded by many uncertainties, the Bank will continue to pay close attention to the impacts of these developments on domestic economic and financial conditions and take appropriate response measures in a timely manner so as to promote financial stability.

Appendix: Financial soundness indicators[64]

Table 1: Domestic Banks

Unit: %

Items / Year (end of year)	2017	2018	2019	2020	2021	2022
Asset size						
Assets to GDP	264.95	270.98	275.32	r 283.23	r 277.05	284.06
Earnings and profitability						
Return on assets (ROA)	0.66	0.68	0.70	0.58	0.58	0.62
Return on equity (ROE) (Pretax)	9.03	9.34	9.49	7.84	8.14	9.33
Return on equity (ROE) (After tax)	7.80	8.09	8.11	6.82	7.11	7.92
Net interest income to gross income	60.03	59.33	56.59	59.95	62.11	66.08
Non-interest expenses to gross income	52.74	51.55	51.30	53.93	53.88	51.89
Gains and losses on financial instruments to gross income	14.85	11.23	18.78	17.06	12.93	1.29
Employee benefits expenses to non-interest expenses	56.75	57.15	56.76	57.05	58.36	56.01
Spread between lending and deposit rates (basis points)	1.36	1.35	1.32	1.22	1.24	1.36
Spread between the highest and the lowest interest rates of interbank O/N lending	0.13	0.13	0.11	0.12	0.22	0.14
Asset quality						
Non-performing loans to total loans	0.28	0.24	0.22	0.22	0.17	0.15
Provision coverage ratio	490.59	573.67	650.30	623.74	781.47	916.53
Capital adequacy						
Regulatory capital to risk-weighted assets	14.17	13.99	14.07	14.84	14.80	14.68
Tier 1 capital to risk-weighted assets	11.78	11.86	12.08	12.79	12.97	12.46
Common equity Tier 1 capital to risk-weighted assets	11.19	11.19	11.32	11.84	11.96	11.13
Non-performing loans net of provisions to equity	-2.18	-1.86	-1.78	-0.51	0.09	-0.06
Leverage ratio	6.42	6.56	6.71	6.82	6.46	6.28

64 In consideration of the IMF *2019 Financial Soundness Indicators Compilation Guide (FSI Guide)*, two categories of indicators comprising life insurance companies and bills finance companies have been added to the financial soundness indicators while the category of market liquidity has been removed since 2020. Thus, the number of indicators increased from 42 to 58. The time series data of removed and pre-adjusted indicators are available on the CBC's website (https://www.cbc.gov.tw/en/cp-486-862-AE8D1-2.html). For more details about explanatory notes for the compilation of financial soundness indicators, please refer to the CBC *Financial Stability Report* May 2021 (https://www.cbc.gov.tw/dl-179551-40697ea7b2d2405bb25f264d2a4987e2.html).

Table 1: Domestic Banks (cont.)

Unit: %

Items / Year (end of year)	2017	2018	2019	2020	2021	2022
Liquidity						
Customer deposits to total loans	138.76	135.75	137.27	142.04	144.30	141.14
Liquid assets to total assets	9.75	9.46	9.05	9.44	9.74	8.89
Liquid assets to short-term liabilities	13.37	13.36	12.53	13.19	13.37	12.20
Liquidity coverage ratio	134.54	133.89	134.82	141.60	136.60	134.13
Net stable funding ratio	-	132.44	132.71	136.51	138.56	138.41
Credit risk concentration						
Loan concentration by economic activity	71.29	70.94	71.43	71.95	72.04	70.90
Large exposures to tier 1 capital*	-	-	-	8.60	8.06	5.88
Gross asset positions in financial derivatives to regulatory capital	5.69	6.38	6.53	8.75	4.32	11.00
Gross liability positions in financial derivatives to regulatory capital	7.02	8.64	7.66	9.36	4.51	10.06
Geographical distribution of loans to total loans						
Domestic economy	80.62	80.33	79.49	80.96	81.23	79.64
Advanced economies	13.30	13.49	14.01	12.66	12.45	14.32
Emerging economies						
Emerging Asia	4.91	5.12	5.42	5.31	5.30	5.05
Emerging Europe	0.06	0.04	0.04	0.02	0.02	0.01
Latin America and the Caribbean	0.48	0.44	0.40	0.37	0.31	0.31
Middle East and Central Asia	0.31	0.27	0.35	0.42	0.47	0.46
Sub-Saharan Africa	0.33	0.32	0.29	0.26	0.22	0.21
Credit of private sector to GDP	146.27	150.92	155.13	r 159.23	r 159.31	160.82

Table 1: Domestic Banks (cont.)

Unit: %

Items / Year (end of year)	2017	2018	2019	2020	2021	2022
Sensitivity to market risk						
Net open position in foreign exchange to capital	3.95	3.78	3.20	3.45	3.58	2.47
Foreign-currency-denominated loans to total loans	20.35	20.14	20.67	18.80	18.06	18.48
Net open position in equities to capital	21.42	22.51	24.56	26.93	31.71	28.37
Foreign-currency-denominated liabilities to total liabilities	26.31	29.21	26.57	26.53	25.80	29.90

Notes:1. Item with "*" is a new indicator to be disseminated from 2020 onward.

2. Figures for "Spread between lending and deposit rates" exclude the data of preferred deposits rates of retired government empolyees and central government lending rates.

3. Non-performing loans net of provisions to equity:

(1) For data before 2019, specific provisions for credit losses refers to minimum provisions that a bank should allocate for classified loans and liabilities on guarantees in accordance with *Regulations Governing the Procedures for Banking Institutions to Evaluate Assets and Deal with Non-performing/Non-accrual Loans.*

(2) Beginning 2020, specific provisions for credit losses, based on the IFRSs 9, refers to the provisions for expected credit losses of financial assets whose credit is impaired.

4. Figures for "Net stable funding ratio" are published from 2018.

5. Credit concentration:

(1) For the data before 2019, large exposures prior refer to the total amount of credit exposures to the first 20 private enterprises at domestic banks (after integration).

(2) Beginning 2020, large exposures are revised to the total amount of credit exposures to an enterprise at domestic banks (after integration) exceeding 10% of its Tier 1 capital.

6. Figures preceded with "r" use revised data based on GDP statistics updated by DGBAS.

Table 2: Life Insurance Companies

Unit: %

Items / Year (end of year)	2017	2018	2019	2020	2021	2022
Assets to GDP	136.03	143.22	155.44	r 159.45	r 153.37	148.34
Return on assets (ROA)	0.50	0.33	0.55	0.67	1.19	0.51
Return on equity (ROE) (pretax)	9.42	6.82	10.24	9.27	14.83	7.97
Return on equity (ROE) (after tax)	9.92	7.81	9.65	9.38	13.78	6.77
Risk based capital (RBC) ratio	304.90	268.43	292.54	299.13	335.17	297.82
Equity to investment assets	6.20	4.60	7.29	8.80	9.10	5.34

Notes: 1. Investment assets include financial assets such as cash, bank deposits, loans, securities, derivatives, and non-financial assets for investment.

2. Figures preceded with "r" use revised data based on GDP statistics updated by DGBAS.

Table 3: Bills Finance Companies

Unit: %

Items \ Year (end of year)	2017	2018	2019	2020	2021	2022
Assets to GDP	5.75	5.52	5.31	r 5.55	r 4.84	4.59
Return on assets (ROA)	1.06	0.96	0.99	1.18	1.27	0.89
Return on equity (ROE) (pretax)	8.80	8.00	8.05	9.33	9.78	7.28
Return on equity (ROE) (after tax)	7.46	6.72	6.67	7.56	8.01	5.92
Capital adequacy ratio	13.93	13.63	13.37	13.38	13.27	13.48
0-30 day maturity gap to assets (NTD)	-24.27	-26.66	-21.39	-18.01	-16.80	-13.76

Note: Figures preceded with “r” use revised data based on GDP statistics updated by DGBAS.

Table 4: Non-financial Corporate Sector

Units: %, times

Items \ Year (end of year)	2017	2018	2019	2020	2021	2022
Total liabilities to equity						
TWSE-listed companies	100.07	99.48	104.61	107.85	106.85	103.65
OTC-listed companies	82.73	82.36	88.55	89.88	98.81	96.79
Return on equity						
TWSE-listed companies	15.81	14.92	12.62	14.60	23.01	21.44
OTC-listed companies	10.44	13.02	12.23	13.95	17.78	17.49
Net income before interest and tax / interest expenses (times)						
TWSE-listed companies	13.60	11.18	9.35	15.70	34.58	23.17
OTC-listed companies	12.88	16.23	15.99	21.99	30.23	24.91
Foreign liabilities to equity*						
TWSE-listed companies	-	-	-	32.48	32.62	30.78
OTC-listed companies	-	-	-	20.11	21.64	19.10

Notes: 1. Data of TWSE-listed and OTC-listed companies are from TEJ.
2. Item with “*” is a new indicator to be disseminated from 2020 onward and the reference date of figures in 2022 is the end of September 2022.

Table 5: Household Sector

Unit: %

Items \ Year (end of year)	2017	2018	2019	2020	2021	2022
Household debt to GDP	83.43	85.11	86.70	r 88.52	r 87.57	88.15
Debt service and principal payments to total disposable income	46.67	45.23	46.13	r 46.48	r 48.46	48.87
Household debt to total disposable income	1.37	1.36	1.39	1.46	r 1.52	1.51

Notes: 1. Figures for “total disposable income” are the sum of household disposable income, rent expense and interest expense.
2. Figure for “total disposable income” for 2022 is a CBC estimate.
3. Figures preceded with “r” use revised data based on GDP and disposable income statistics updated by DGBAS.

Table 6: Real Estate Market

Units: index, %

Items \ Year (end of year)	2017	2018	2019	2020	2021	2022
National housing price index	100.60	100.80	104.14	108.17	117.50	127.51
Residential real estate loans to total loans	29.82	29.73	29.44	32.04	32.52	31.79
Commercial real estate loans to total loans	17.54	17.78	17.73	19.37	19.69	19.54

Abbreviations

ABS	Australian Bureau of Statistics
ACH	Automated clearing house
ADR	American depositary receipt
AT1	Additional Tier 1
ATM	Automated teller machine
BICRA	Banking Industry Country Risk Assessment
BIS	Bank for International Settlements
BoE	Bank of England
BOJ	Bank of Japan
BOK	Bank of Korea
BPS	Basis points
BSI	Banking system indicator
BTFP	Bank Term Funding Program
CBC	Central Bank of the Republic of China (Taiwan)
CD	Certificate of deposit
CET 1	Common Equity Tier 1
CIFS	CBC Interbank Funds Transfer System
CISO	Chief information security officer
CNY	Renminbi
CoCo	Contingent convertible
COVID-19	Coronavirus disease 2019
CP	Commercial paper
CPI	Consumer price index
DBU	Domestic banking unit
DGBAS	Directorate-General of Budget, Accounting and Statistics of the Executive Yuan
D-SIB	Domestic systemically important bank
ECB	European Central Bank

EPA	Environmental Protection Administration
ESG	Environmental, social, and corporate governance
EU	European Union
EUR	Euro
FCEC	Foreign currency exchange counters
FDIC	Federal Deposit Insurance Corporation
Fed	Federal Reserve System
FISC	Financial Information Service Co., Ltd.
FRB	First Republic Bank
FSB	Financial Stability Board
FSC	Financial Supervisory Commission
FSIs	Financial soundness indicators
FX	Foreign exchange
GDP	Gross domestic product
GDR	Global depository receipt
GHG	Greenhouse gas
ICS	Insurance capital standard
IFIS	Inter-bank Financial Information System
IFRS	International Financial Reporting Standard
IMF	International Monetary Fund
JCIC	Joint Credit Information Center
JPY	Japanese yen
KRW	Korean won
KWh	Kilowatt hour
LCR	Liquidity coverage ratio
LGFV	Local government financing vehicle
LTV	Loan-to-value
MOEA	Ministry of Economic Affairs
MOF	Ministry of Finance
MOI	Ministry of the Interior
MOTC	Ministry of Transportation and Communications
MPI	Macro-Prudential Indicator
MSCI	Morgan Stanley Capital International

MYR	Malaysian ringgit
NCD	Negotiable certificates of deposit
NEER	Nominal effective exchange rate
NGFS	Network for Greening the Financial System
NPL	Non-performing loan
NSFR	Net stable funding ratio
NTD	New Taiwan dollar
OBU	Offshore banking unit
OTC	Over-the-counter
PBOC	People’s Bank of China
PPI	Producer price index
PPS	Percentage points
RBC	Risk-based capital
REER	Real effective exchange rate
Repo	Repurchase agreement
RMB	Renminbi
ROA	Return on assets
ROE	Return on equity
SGD	Singapore dollar
SME	Small and medium-sized enterprises
SVB	Silicon Valley Bank
TAIEX	Taiwan Stock Exchange Weighted Index
TCH	Taiwan Clearing House
TDR	Taiwan depositary receipt
TEJ	Taiwan Economic Journal Co., Ltd.
TFVI	Taiwan financial vulnerability index
TPEx	Taipei Exchange
TPEX	Taipei Exchange Capitalization Weighted Stock Index
T-SDGs	Taiwan Sustainable Development Goals
TWSE	Taiwan Stock Exchange
UBS	Union Bank of Switzerland
USD	US dollar
UST	TerraUSD

VaR	Value at risk
WAL	Western Alliance Bancorporation
WPI	Wholesale price index

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